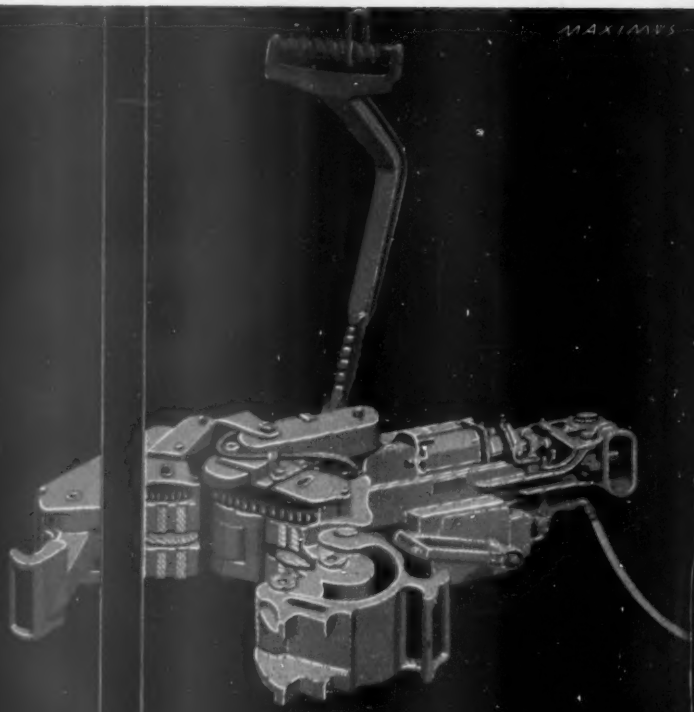
the OIL AND GAS JOURNAL

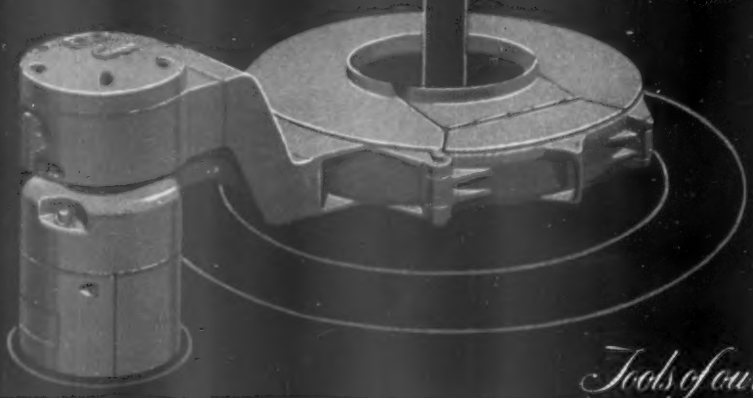
power pays off in drilling

BJ



POWER TONG

POWER SLIPS



Tools of our Trade No. 4

PRICE 50 CENTS TABLE OF CONTENTS ON PAGE 1 JULY 13, 1953

Announcing

THE NEW Cameron "SPACE SAVER" BLOWOUT PREVENTER

specially designed for rigs having limited space under the floor

- ✓ **MOST COMPACT DESIGN**—10" series 900 model only 27" high, 21½" wide and 53½" long.
- ✓ **TWO PREVENTERS IN ONE**—Any desired combination of pipe and blind rams.
- ✓ **FULL PRESSURE OPERATION**—Plus utilization of well pressure behind rams to maintain seal.
- ✓ **FAST, EASY RAM CHANGING**—Using operating fluid pressure.
- ✓ **FAVORABLE CLOSING RATIO** (4:1 Approx.)—3000 lb. well pressure controlled by 750 lb. closing pressure.
- ✓ **SELF-FEEDING RAM PACKING**—A Cameron exclusive.
- ✓ **OVAL RAMS**—No flat surfaces to accumulate sand or cuttings.
- ✓ **BUILT-IN PRESSURE OPERATION CONDUITS**

Cameron

IRON WORKS, INC.

P. O. Box 1212, Houston, Texas.
Export: 7912 Empire State Bldg., New York, N. Y.

the OIL AND GAS JOURNAL

JULY 13, 1953 VOL. 52 NO. 10

OIL IN THE NEWS . . .

Microscopic Plastic Balloons Cut Crude Evaporation Loss	74
Shell Will Build New 50,000-Bbl. Refinery at Anacortes	76
Water-Flood Operators Tour Projects in Eastern Kansas	77
Tubular Goods No Scarcer With Government Controls Off	79
World's Biggest Gas-Extraction Units Go on Stream	80
Industry Defends Crude Hike Before House Committee	81
Arkansas Challenges Tidelands Quitclaim Law in Federal Court	83
Bill Would Allow 5-Year Amortization for All New Facilities	84
New Mexico Wildcat Opens New Geological Province	84
Missouri River Reservoir to Inundate Williston Acreage	85
Sahara Desert Area of Algeria Scene of Intensive Exploration	86
Private Firms Still Active in Southern and Central Italy	86
Aminoil to Spud Third Neutral Zone Well Within a Week	87
Gulf Boost Price of Kuwait Crude 25 Cents Per Barrel	88
U.B.O.T. Reports Small Discoveries in Trinidad Oil Search	89
Another Tilted Water Table Proved	177
Tilted Water Table at Northwest Lake Creek Explained	178
East-of-California Crude Prices Up About 25 Cents	194

NEWS FEATURES . . .

They Say	55
Calendar of Events	60
Journally Speaking	69
Editorial	71
This Week	73
Watching Washington	82
International News	86
Personals	90
Deaths in the Industry	94
Pipe-Line News	167
Natural-Gas News	171
Refining News	172
Petrochemical Notes	173
Drilling Contractors	174
Exploration Statistics	197
Production Statistics	198
Refining Statistics	199
Market Statistics	200

TECHNOLOGY AND OPERATION . . .

Criterion for Water Floodability *By N. Johnston, T. J. Nowak, and J. E. Klipp*	96
Scale Models in Refinery Design *By D. H. Stormont*	104
Atlas Produces Better-Than-Nitration-Grade Benzene	105
Hesitation-Squeeze Cementing for Water Shutoff *By Carl B. Bowden*	111
Something New in Refinery Flare Stacks *By Ted Armstrong*	118
Appalachian Basin Is Active Exploratory Area *By Jim D. Harvel*	123
Operating Report: First Pipe-Line Centrifugal Compressor *By C. Carl Cooper, Jr.*	131
Picture Tour . . . Gas-Storage Project	138
Engineering Reference Section	143-150

DEPARTMENTS . . .

Journal Check Chart	102
Engineering Reference	143
Modern Drilling	145
Engineering Fundamentals	147
Questions on Technology	149
Equipment Men in News	152-204
Equipment Digest	157
Pipe-Line Construction	161
Active Rotary Rigs	174
Areal Field Reports	180
Classified Advertising	201
Advertisers' Index	205

In Brief . . .

1. FLOOD CRITERION . . . Residual-oil content of water-base wire-line cores can be used to predict feasibility of water flooding a reservoir, provided that low-viscosity oils are produced. Results of 10,464 analyses show that residual-oil saturation depends on the reservoir oil-water viscosity ratio. However, the method is not recommended for high-viscosity oils. A tentative borderline, at 3,000 ft. depth, of 30 for the oil-water viscosity ratio is useful.

•

2. BETTER BENZENE . . . Atlas Processing Co. is recovering research-grade benzene from naphtha obtained from natural gas in the Carthage, Tex., gas field. The naphtha contains no sulfur or olefins, but does contain 3 to 4 volume per cent of naturally occurring benzene. The benzene is recovered in a phenol extractive-distillation unit. Charge to the extraction unit is 15,000 bbl. per day. Recovery of benzene is 97 to 99 per cent, resulting in the production of 21,500 gal. per day of nitration-grade material.

•

3. SQUEEZE CEMENTING . . . A hesitation-squeeze cementing technique, developed in the Sansinena, California, field, is successful in increasing initial success on cement jobs from 25 to 88 per cent in slant-hole drilling. The method is applicable in many areas throughout the country. The technique is not recommended when depleted or lost-circulation zones are exposed below the cement ports.

•

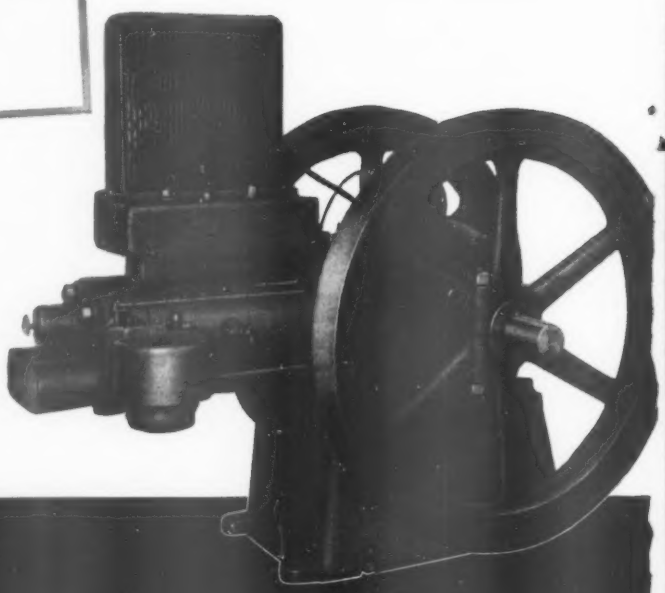
4. ACTIVE AREA . . . The most intensive leasing and drilling campaign in the history of the Appalachian basin of northern Mississippi and Alabama is rapidly unfolding. It is predicted that the basin may soon prove to be an important oil and gas producer. An estimated 1,500,000 acres have been leased since November 1951. Four gas or gas-distillate fields have been discovered in Mississippi since that time, and a possible fifth is being tested through production casing.

•

5. COMPRESSOR OPERATION . . . An 1,850-hp., simple-cycle, gas-turbine centrifugal compressor unit has been in operation for several years on gas pipe-line service. Results are: (1) Unit is practical in this service; it is capable of sustained operation and has developed 2,000 b.hp. under test loading; (2) station and installation costs per horsepower are lower than usual; and (3) the unit is very flexible, operating successfully at various rates of flow and compression ratios.

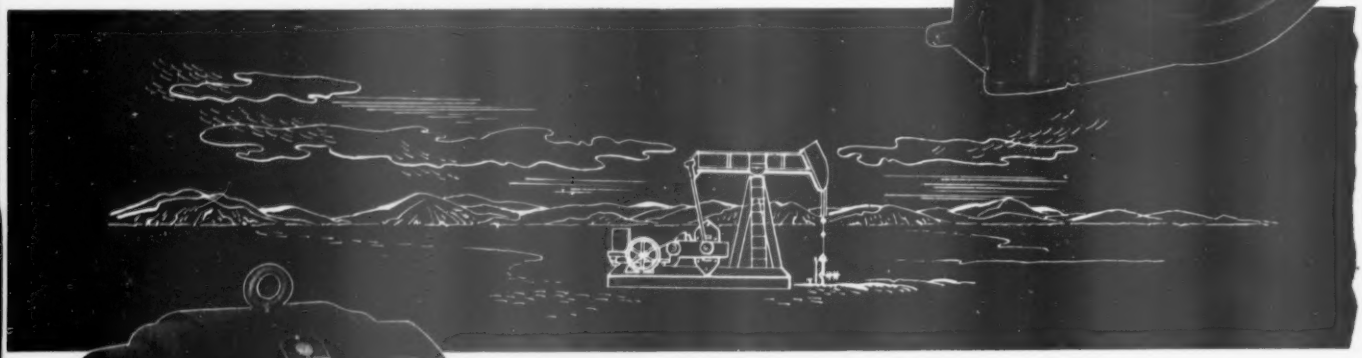
For Oil Well Pumping

FAIRBANKS-MORSE
serves you best!



If you choose engines,

the famous Fairbanks-Morse "ZC" is your best choice for economical, efficient service. The big, *extra* heavy flywheels of the "ZC" assure considerable savings in gas or gasoline . . . protect engine and driven equipment against excessive wear. The simple, rugged, single-cylinder "ZC" design means easy maintenance . . . no complicated parts to cause trouble.



If you choose motors,

the Fairbanks-Morse General Purpose Motor is your choice for stand-out . . . stand-up performance. Check the exclusive, indestructible "Copperspun Rotor" . . . unique cross-flow ventilation . . . protected, one-piece cast frame and it's easy to see why they are tops for the heavy starting loads and long-period, peak-capacity operation of oil field service.

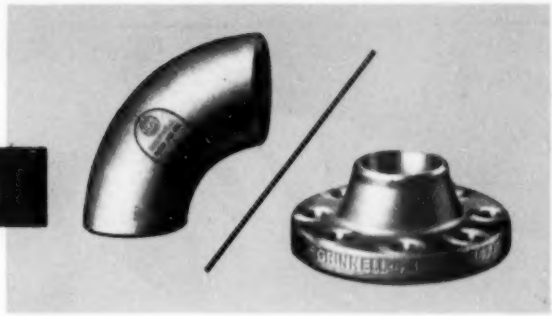
And, remember,

since Fairbanks-Morse manufactures both motors and engines, we are able to recommend, without prejudice, the exact power choice that will serve your pumping needs best. Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5, Ill.

FAIRBANKS-MORSE
a name worth remembering when you want the best

OIL FIELD EQUIPMENT • PUMPS • SCALES • ELECTRIC MOTORS • GENERATORS • LIGHT PLANTS • DIESEL, DUAL FUEL & GASOLINE ENGINES • MAGNETOS • DIESEL LOCOMOTIVES

for trouble-free service



GRINNELL

STAINLESS STEEL WELDING FITTINGS and FLANGES

To help combat mounting costs in the installation and maintenance of piping systems where corrosive or certain other service conditions are involved, Grinnell offers a comprehensive range of welding fittings and flanges in stainless steel.

- To prevent corrosive attack.
- To obtain adequate impact resistance at low temperatures and sufficient creep strength at high temperatures.
- To provide sanitary conditions.
- To avoid contaminating the product.

Grinnell welding fittings and flanges are available in types 304, 347 and 316. These are in the chromium-nickel grades known as "18-8". The corrosion resistant properties of stainless steels are primarily due to the chromium content which ranges from 17% to 20%. The addition of nickel in ranges from 7% to 14% improves the corrosion resistance as well as the properties at elevated temperatures. A molybdenum addition of 2% to 3%, as found in type 316, increases the resistance to sulphurous and phosphoric acids, brine and hypochlorite solutions, and improves the general resistance to other corrosive liquids, as well as improving the physical properties at elevated temperatures. A columbium addition of approximately 0.4% to 1.0%, as found in type 347, creates non-susceptibility to carbide precipitation which can cause intergranular corrosion.

In addition to stainless steel, Grinnell offers welding fittings and flanges in carbon steel, nickel, Inconel, Monel, aluminum and brass.

Write for new booklet giving complete data on Grinnell stainless steel welding fittings and flanges. No obligation.

stainless steel welding fittings
Types 304, 347, 316

DESCRIPTION	SCHEDULE†	PIPE SIZE, IN.‡
90° Long Radius Elbow 45° Long Radius Elbow 180° Long Radius Return Straight Tee	5s, 10s, 40s, 80s	½ to 12
Reducing Tee	5s, 10s, 40s, 80s	¾ to 12
Cross (Straight and Reducing)	5s, 10s, 40s, 80s	1¼ to 12
Concentric Reducer Eccentric Reducer	5s, 10s, 40s, 80s	¾ to 12
Lateral (Straight or Reducing)	5s, 10s, 40s, 80s	1 to 12
Cap	5s, 10s, 40s, 80s	½ to 12
Lap Joint Stub End-Long	10s, 40s, 80s	½ to 12
Lap Joint Stub End-Short	5s, 10s, 40s,	½ to 12

† 5s is Featherweight, 10s Lightweight, 40s Standard, 80s Extra Strong.
‡ Larger sizes available on special order.

stainless steel flanges

150 lb. and 300 lb. Steel Flange Standard *(Higher series available on application).*

DESCRIPTION	PIPE SIZE, IN.
Welding Neck Slip-on Lap Joint Threaded Socket Type Blind	½ to 24

150 lb. Corrosion Resistant Standard. *(For use with schedule 10s and 5s pipe. Rated at 150 psi at 500°F, 225 psi at 150°F, when used with full-faced gaskets).*

DESCRIPTION	PIPE SIZE, IN.
Buttwelding Slip-on Blind	½ to 12

GRINNELL
WHENEVER PIPING IS INVOLVED

Grinnell Company, Inc., Providence, Rhode Island • Coast-to-Coast Network of Branch Warehouses and Distributors

pipe and tube fittings • welding fittings • engineered pipe hangers and supports • Thermolier unit heaters • valves
Grinnell-Saunders diaphragm valves • pipe • prefabricated piping • plumbing and heating specialties • water works supplies
industrial supplies • Grinnell automatic sprinkler fire protection systems • Amco air conditioning systems

"We hold these truths to be self-evident,— that all men are created equal; that they are endowed by their Creator with certain inalienable rights; that among these are life, liberty, and the pursuit of happiness."

—Thomas Jefferson (1743-1826)

AMERICANS ARE GREAT for *any* job where unit pumping is practical, because American Manufacturing Co. can furnish exactly the right combination of structure and reducer to pump any particular well most economically. The complete line of American Pumping Units from the husky little T-5 to the big, powerful T-27 are described in Catalog 151. Ask your favorite supply store or write the nearest American office.

AMERICAN

MANUFACTURING COMPANY OF TEXAS

FORT WORTH 11, TEXAS

Branch Offices: HOUSTON—KILGORE—ODESSA—TULSA

WALWORTH VALVES
for the OIL AND GAS INDUSTRIES

The Walworth Company — with over 100 years of valve manufacturing experience — has supplied valves to the petroleum industry since Colonel Edward L. Drake first struck oil in Titusville, Pa. Men who have grown up with the oil and gas industries throughout the world know that they can count on Walworth to furnish the right valves for their services.

The valves and fittings illustrated are typical of the approximately 50,000 items that comprise Walworth's complete line of steel, iron, bronze and special alloy valves, pipe fittings, and pipe wrenches.

WALWORTH

valves...fittings...pipe wrenches

60 East 42nd Street, New York 17, N. Y.

Distributors in principal centers throughout the world.

The Oil and Gas Journal, published Mondays, copyright 1953, by The Petroleum Publishing Company. Entered as second-class matter September 1, 1910, at post office at Tulsa, Okla., under act of March 3, 1879. U. S. and foreign rates to the petroleum industry, $4 yearly.

"Our Dodge Trucks are outstanding in economy and dependability!"

Why new DODGE *"Job-Rated"* TRUCKS are top performers for oil field operations

PULLING POWER THAT'S BUILT TO LAST!

Dodge trucks provide the *right* power with seven great engines—3 all-new—ranging from 100 to 171 h.p. Twin carburetion available on 2½-ton through 4-ton models. And Dodge power is economical, thanks to features like chrome-plated top rings with 4-ring aluminum-alloy pistons, two fuel filters, higher compression ratios, floating oil intakes and many more advantages, designed to reduce upkeep and maintenance costs.

MANEUVERABILITY THAT SAVES TIME!

Shorter over-all lengths, wide front treads and shorter wheelbases give Dodge trucks the greatest maneuverability of any popular make. What's more, Gross Combination Weights are increased by as much as 5,000 pounds for greater payloads. See or call your Dodge dealer soon. He's anxious to show you how to trim plenty from your trucking costs.

. . . say executives of the **Hancock Oil Company,** *Long Beach, California*

"We've used Dodge trucks for twenty years. They average thousands of miles each year and are on the job every day. Yet maintenance work is seldom required. We are completely satisfied with the top performance our Dodges give us. They are outstanding in economy and dependability!"

"Our drivers like Dodges, too. They are easy to handle and maneuver even for rugged off-the-road work. Right now our eye is on the new Dodge models with their greater cubic inch engines. They've got the power we need!"

"Whether on makeshift roads in the oil fields or smooth-surfaced roads, Dodge trucks satisfactorily meet our standards. With our varied operations, we need trucks to fit each job and, large job or small, there's a Dodge truck that meets our requirements."

DODGE
"Job-Rated" TRUCKS

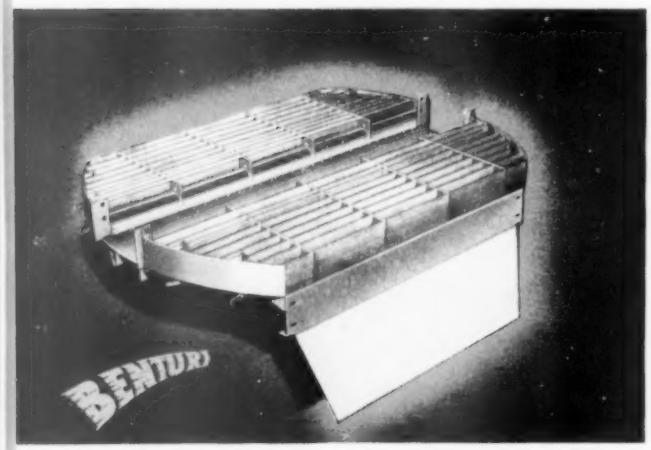
Is Thruput your problem?

A 30% to 100% increased thruput is no problem with Koch "Benturi" Kaskade trays. The inherent design of "Benturi" trays makes the greatest possible use of available slot energy forces. This is why almost 37% of all "Benturi" installations have been replacements for conventional bubble trays. Wire, write or phone us on the application of "Benturi" trays to your problem; no obligation.

KOCH ENGINEERING COMPANY, INC.

DESIGNERS • MANUFACTURERS • BUILDERS

321 WEST DOUGLAS — WICHITA 2, KANSAS



REPRESENTATIVES

Eastern and Export
30 Rockefeller Plaza
New York City

Tulsa, Okla., Repr.
Myers-Bagwell Co.
Wright Building

Pittsburgh, Pa., Repr.
D. D. Foster Co.
501 Alcoa Building

British Associates
Messrs. A. F. Craig & Co., Ltd.
Paisley, Scotland

Men who depend on power...know they can depend on CUMMINS®

9-120

CUMMINS DIESELS *are engineered to make light work of tough jobs*

Why do oil field operators count on Cummins for dependable power in toughest going?

You'll find part of the answer in the special kind of versatility that belongs to Cummins Diesels alone. It's versatility that goes beyond the handling of all kinds of jobs. It's actually an ability to meet every power requirement that any situation demands . . . to save on fuel, do more work per dollar, whether the call is for continuous power or stop-and-go operation over a wide and flexible speed range.

Yes, you can count on a (60-600 h.p.) Cummins Diesel for dynamic versatility in every job — performance that stems from an exclusive fuel system and precision engineering. See your Cummins dealer for all the facts. He's a diesel specialist . . . ready to help solve your power problems.

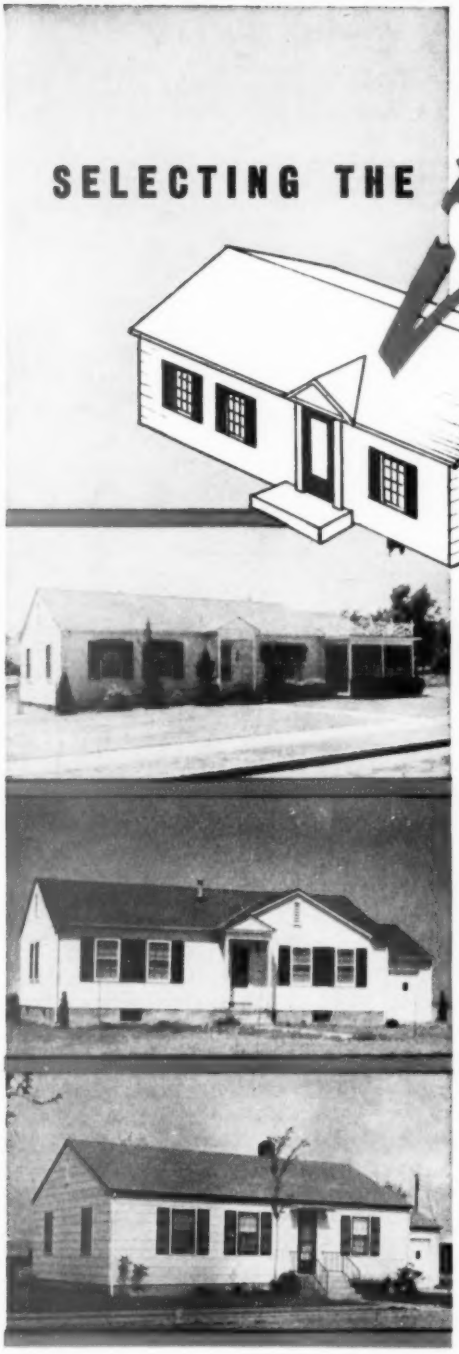
CUMMINS

Enjoy thrilling 16mm Technicolor Sound Movie "DIESEL RACE CAR"
PRINTS AVAILABLE FOR GROUP SHOWINGS! WRITE TODAY.

***Leaders** in rugged, lightweight high-speed diesel power!*

CUMMINS ENGINE COMPANY, INC., Columbus, Ind. *Export:* Cummins Diesel Export Corp., Columbus, Ind., U.S.A. • Cable: CUMDIEX

SELECTING THE *RIGHT* FIELD HOUSING IS *IMPORTANT...*



It's good employee relations to see that oil field workers have comfortable homes. It is good business to select field housing that has proved right for the oil industry for almost 35 years.

STURDYBILT Prefabricated Houses are *right* for the oil fields because they are economical, easy to erect, can be moved from one site to another, and are handsome and comfortable enough to suit the most particular oil field family.

Get the RIGHT field housing. Order STURDYBILT Prefabricated Houses.

■ **WRITE FOR INFORMATION**

MANUFACTURERS OF SPECIAL MILLWORK: DISTRIBUTORS OF JOHNS-MANVILLE BUILDING MATERIALS; CURTIS WOODWORK

STURDYBILT

PREFABRICATED, DEMOUNTABLE HOUSES

SOUTHERN MILL & MANUFACTURING CO. • TULSA, OKLAHOMA

STURDYBILT HOUSES COMPLY WITH COMMERCIAL STANDARD CS125 OF THE NATIONAL BUREAU OF STANDARDS FOR PREFABRICATED HOMES

JOHNSON OIL REFINING COMPANY

CLEVELAND — OKLAHOMA

JOHNSON SERVICE STATIONS AND DISTRIBUTORS THROUGHOUT THE MIDDLEWEST

brilliant bronze

REFINERY, CLEVELAND, OKLA.
LUBRICATING PLANT
CHICAGO HEIGHTS,
ILLINOIS

June 11, 1953

Universal Oil Products Company
30 East Algonquin Road
Des Plaines, Illinois

Attention: Harvey Blankenship

Dear Harvey,

This month, we will reach several milestones in the operation of our Platformer. The date of June 21st, will be the second anniversary of our operations. We are still operating on the original catalyst charge and we have reason to think that it will last some longer. Our operations indicate that we are now making more light ends and that we are getting more hydro-cracking than on past performance but our yields have remained about the same throughout our entire operation.

On June 21st, our anniversary, we will have reached a thru-put of about 1,050,000 barrels and a true platformate production of 971,250 barrels. We will have charged 160 barrels of reactor charge for each lb. of initial catalyst, at a catalyst cost of less than 2.5¢ per barrel.

During the 2 years of operation, we have been down 25 days due to strike and 17 days for inspection, minor repairs and changes. We thought that this information might be of interest and value to you.

Sincerely yours,

W. J. Leenhouts
Refinery Manager

WJL/ds

YES, MR. LEENHOUTS . . .

THIS IS VALUABLE INFORMATION

TO EVERY PETROLEUM REFINER

PLATFORMING

. . . developed, designed and licensed by

UNIVERSAL OIL PRODUCTS COMPANY

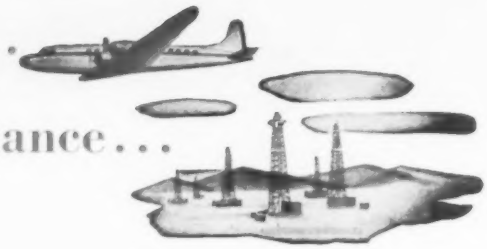
30 ALGONQUIN ROAD, DES PLAINES, ILL., U.S.A.

Laboratories: RIVERSIDE, ILLINOIS

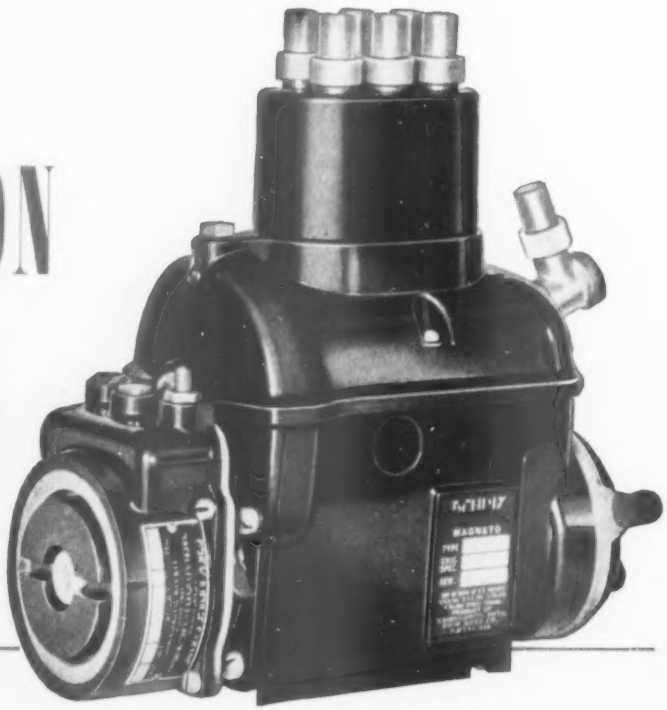
Universal Service Protects Your Investment

For Sky-High Quality . . .

and Down-to-Earth Performance . . .



BENDIX LOW-TENSION MAGNETOS



CONTROL EXPLOSIVE FUMES with FLAME-PROOF VENTILATION!

The Scintilla Magneto Division of the Bendix Aviation Corporation, foremost producer of low tension ignition systems for the aviation industry, now manufactures this same system to fully meet an important safety requirement of the petroleum industry's engine operations. For example, a special ventilating arrangement permits even air laden with explosive fumes to enter the magneto for ventilation without danger of igniting the surrounding air. Kits are also available to convert magnetos now in use to the "flame-proof" ventilation type.

With the Bendix Low-Tension Magneto, spark plug erosion is reduced to a minimum and variable or fixed ignition can be obtained by internal adjustment. The distribution of low tension voltage to the high tension coils is through a series of breaker assemblies, thus eliminating trouble often experienced with a conventional distributor.

For safety and low operating costs be sure to specify Bendix Low Tension for your magneto requirements. Complete data available on request.

- Low Plug Erosion Rate
- Breaker Type Distributor
- Ventilation without Fire Hazard
- Radio Shielding Available
- Variable or Fixed Ignition

Bendix

SCINTILLA MAGNETO DIVISION OF

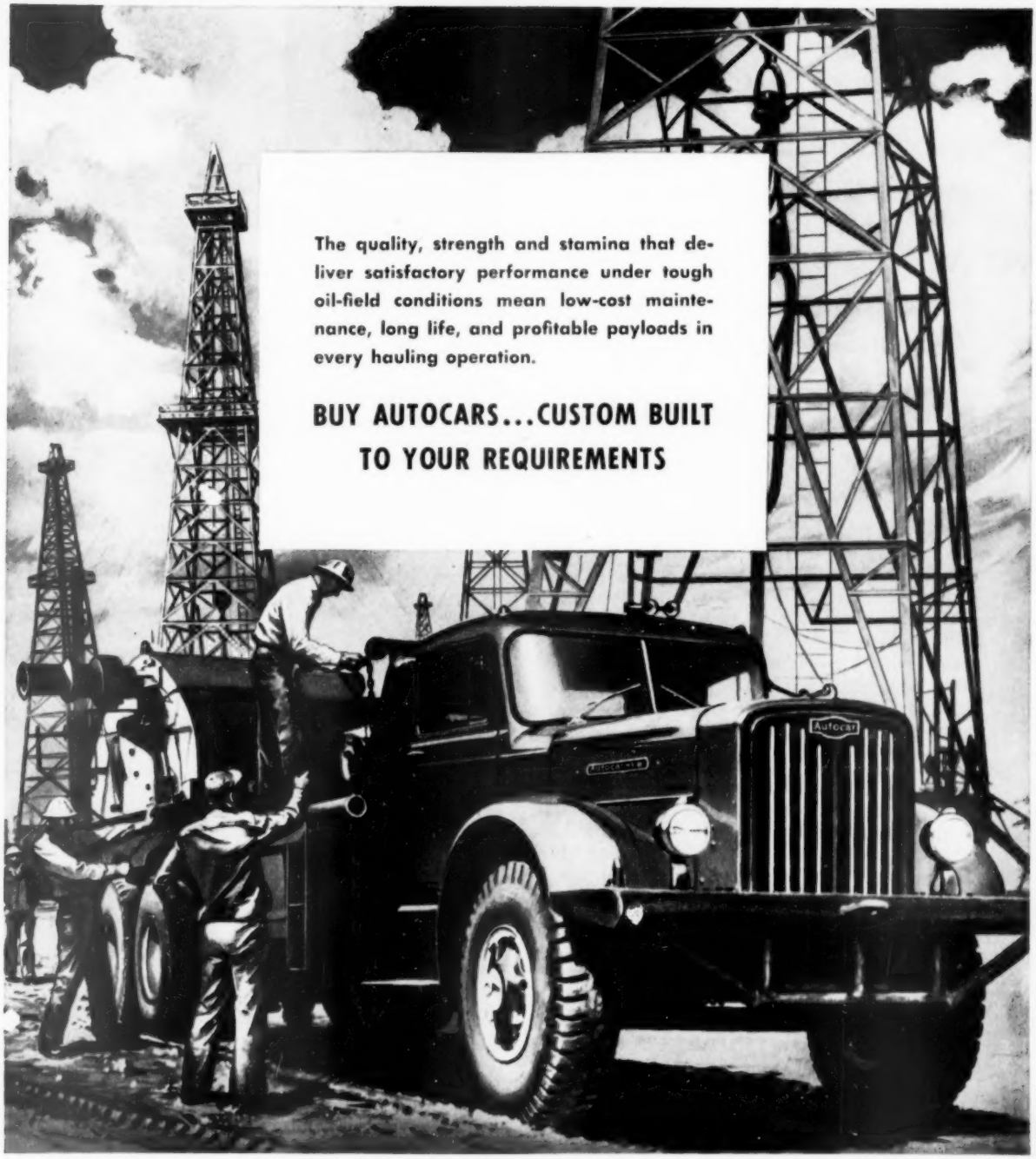
SIDNEY, NEW YORK

Export Sales: Bendix International Division, 72 Fifth Avenue, New York 11, New York

Bendix AVIATION CORPORATION

FACTORY BRANCH OFFICES:

117 E. Providencia Avenue, Burbank, California • Stephenson Building, 6560 Cass Avenue, Detroit 2, Michigan
Brouwer Building, 176 W. Wisconsin Avenue, Milwaukee, Wisconsin • 582 Market Street, San Francisco 4, California



The quality, strength and stamina that deliver satisfactory performance under tough oil-field conditions mean low-cost maintenance, long life, and profitable payloads in every hauling operation.

BUY AUTOCARS...CUSTOM BUILT TO YOUR REQUIREMENTS

AUTOCAR TRUCKS

The Autocar Company, Ardmore, Pa.

Established 1897

Factory Branches and Distributors from Coast to Coast in the United States and Canada

●

Export Division:

Drexel Building, Philadelphia 6, Pa., U.S.A.

Clip this coupon . . . mail it today

The Autocar Company, Ardmore, Pa.

Please send me more information about Autocars custom-built to my needs.

Name _____

Firm Name _____

Address _____

Number of trucks in fleet _____

Type of Operation _____

196

NEW!

a chemical injection valve that's made to give you

Constant Controlled Flow

This valve only goes where the going is roughest.

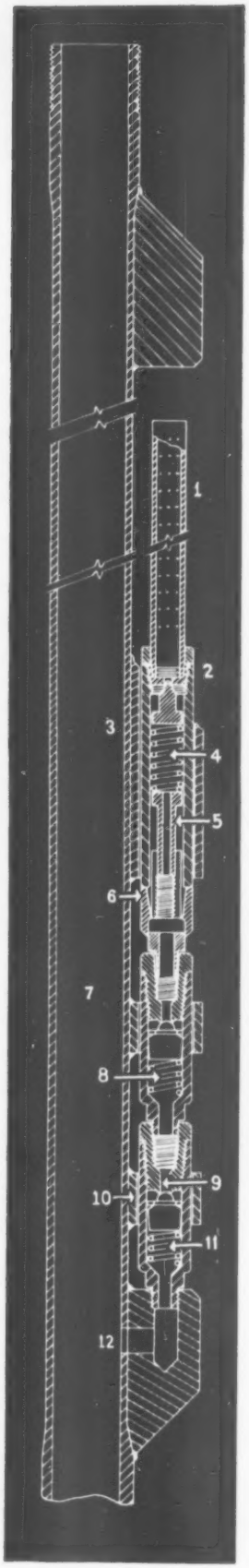
It is a chemical injection valve. It's put at the bottom of the well and it's put there to stay. It has to keep functioning even though exposed to *corrosion* by sour crude, hydrogen sulfide and brine . . . constantly. Its moving parts have to withstand *wear* — have to keep their tolerances indefinitely. Its three springs have to keep their resistance to *fatigue* so that, once set, the valve will admit the chemical at the predetermined rate, without losses . . . regardless of pressure surges in the tubing.

When the Macco Oil Tool Company designed this valve, they were faced with the problem of providing only materials that would conform to these requirements. That's why they made the valve entirely of Inco Nickel Alloys — Monel® and Inconel®.

Both Monel and Inconel offer protection against the severest oil field conditions. They resist corrosion by sour crude — even in hot wells, at high pressure. They protect against cutting action by gas and provide exceptionally good resistance to abrasion and erosion by entrained solids even at high velocities.

Right now, because so much is taken for defense, Monel and Inconel — like all Inco Nickel Alloys — are on extended delivery. However, by ordering your equipment well in advance, and including NPA rating and full end-use information, you'll improve your chances of getting delivery when you need it. And call on Inco's Technical Service any time you run into problems involving metals for oil field use. A brief note will bring you a prompt reply. No charge or obligation, of course. The International Nickel Company, Inc., 67 Wall Street, New York 5, N. Y.

Monel — Inconel...YOUR PARTNERS IN PROGRESS



All parts made of Monel and Inconel!

A Valuable Tool for Corrosive Wells.

The *Macco* Bottom-Hole Chemical Injection Valve assembly provides an effective method of inhibiting corrosion by adding controlled amounts of inhibitor to well fluids.

In operation, inhibitor is injected into the annulus down to a packer, and admitted to tubing through a valve. The valve is designed to inject the same amount of inhibitor as the pump supplies—regardless of the head of inhibitor present in the annulus or variable tubing pressures.

The *Macco* Valve is constructed of Monel and Inconel, two rugged Inco Nickel Alloys that have proved their value in making oil field equipment more resistant to corrosion, erosion, wear and fatigue. Additional information may be obtained directly from *Macco Oil Tool Company*, 1521 Prince, Houston, Texas, through whose courtesy the illustration and technical material on this page were supplied.

1. INCONEL SCREEN
2. INJECTOR VALVE PORT (5/16")
3. PROTECTOR SLEEVE
4. INCONEL STRESS EQUALIZED SPRING
5. ADJUSTABLE PEDESTAL FOR ADJUSTING LOAD RATE ON SPRING
6. INHIBITOR INJECTION VALVE
7. REGULAR TUBING SPACE (NIPPLE)
8. NORMALLY CLOSED CHECK VALVE
9. CHECK VALVE PORT (3/8")
10. PROTECTOR SLEEVE
11. NORMALLY CLOSED CHECK VALVE
12. MANDREL PORT (1/2")

INCO TRADE MARK

HOTEL CARRERA
Santiago, Chile

HOTEL DEL PRADO
Barranquilla, Colombia

HOTEL GRANDE
Belém, Pará, Brasil

THE PRINCESS
Bermuda

A NEW HAVEN OF COMFORT IN MARACAIBO

INTERCONTINENTAL HOTELS CORPORATION

announces the opening of the

COMPLETELY AIR-CONDITIONED

HOTEL *del Lago*

MARACAIBO VENEZUELA

Here is a hotel that has been custom-built for its surroundings! On the shores of Lake Maracaibo, it takes full advantage of the tropical splendour and marine vistas all about it. Its 150 rooms and public space are completely air-conditioned and are equipped with furnishings designed and tested through IHC research. A beautiful outdoor swimming pool is another unusual feature.

Reservations may be made through your travel agent, or the Intercontinental Hotels Corporation, or any IHC hotel.

CABLE: INHOTELCOR

INTERCONTINENTAL HOTELS CORPORATION
41 EAST 42nd STREET, NEW YORK 17, N.Y.
MURRAY HILL 2-4310

HOTEL REFORMA
Mexico D. F., Mexico

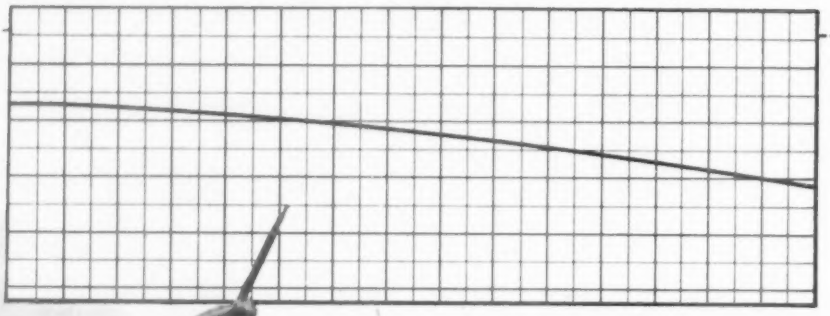
HOTEL TEQUENDAMA
Bogotá, Colombia

HOTEL TAMANACO
Caracas, Venezuela

HOTEL VICTORIA PLAZA
Montevideo, Uruguay

P&H Diesel Engines

(2-CYCLE)

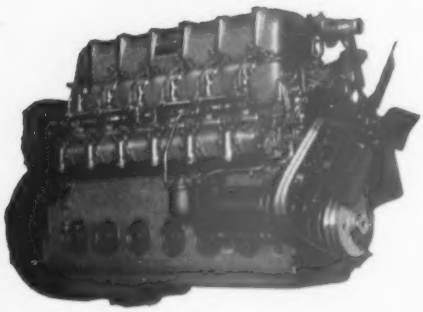


Can your diesels match this torque curve?

This is the torque curve for the P&H Model 687-C Diesel Engine. Note how the torque characteristics are sustained throughout its entire horsepower range.

That means steady, responsive power at all speeds — greater lugging "ability" for those toughest jobs. It's the kind of unfaltering performance that assures more profits in any service, constant or intermittent.

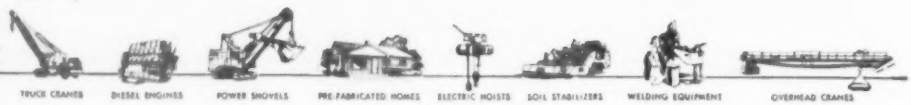
Steady torque for steady work is just another outstanding feature of P&H Diesel Engines — America's most advanced line. Ask your P&H Diesel representative for the full story. Or write for literature.



P&H Diesel Engines are built in 1, 2, 3, 4 and 6-cylinder models — up to 145 h.p.

P&H DIESEL DIVISION
HARNISCHFEGER CORPORATION
CRYSTAL LAKE, ILLINOIS

the P&H *Line*



HALLIBURTON'S *NEW*
HYDROSPRING TESTER

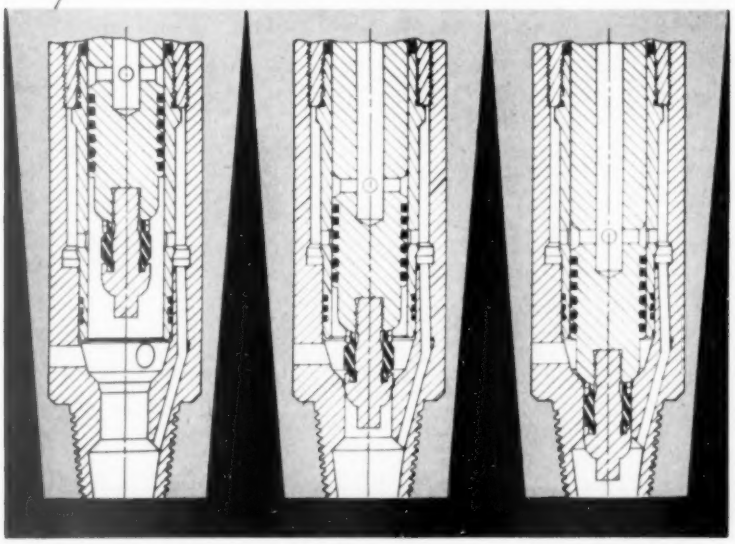
REACHES BOTTOM EASIER, FASTER

A clean line on the pressure chart shows the smoother, easier descent of Hydrospring. And it can be run in as fast as the driller desires.

This important advantage results from a locked open by-pass that squeezes packer through tight holes. It eliminates undue spudding, drill pipe manipulation, and surging pressures on the recording chart. It prevents pressure build up below the packer, and consequent breakdown of formations, possible loss of circulation. It also prevents the forcing of mud into test formation, the fracturing or disturbing of formation, and damaging the hole by tight packer.

All this is but one advantage of Hydrospring Tester. There are many more features:

- **It opens easily and positively by weight of drill pipe — eliminates rotating, dropping of bar, turning of J-slots.**
- **It gives positive indication at surface that tool is open.**
- **It's a combination tool requiring fewer assemblies.**
- **It permits reversing off bottom simultaneously with taking closed in pressure.**
- **It can be rotated coming out of the hole.**



Vertical section of tester at start of time delay after weight has been applied.

End of time delay period to allow packer expansion before opening of tester.

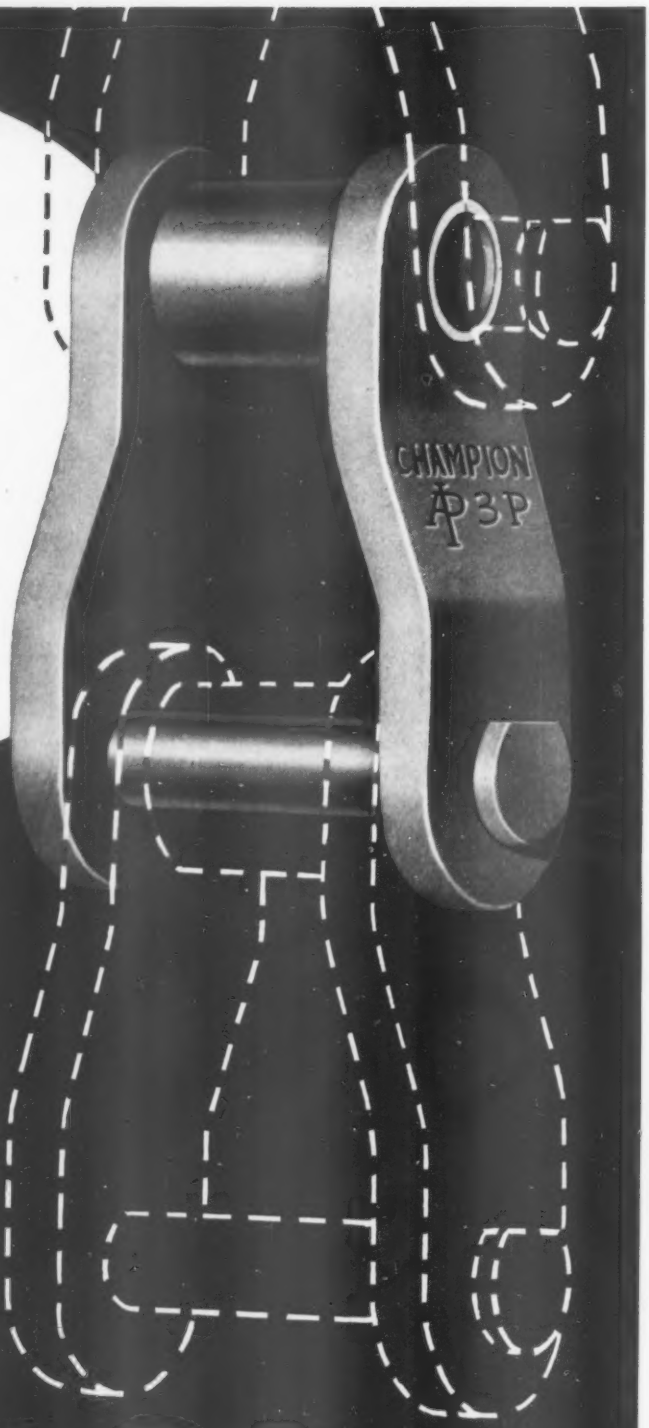
Tester is open and full weight of mud is exerted on packer.

Hydrospring has performed perfectly in over 1500 jobs! It's a new concept of drill stem testing that is the talk of the industry and, more than ever, makes Halliburton best for your drill stem test. Get the full story of Hydrospring before you make your next test. Phone your nearby Halliburton Testing Operator or contact Halliburton Oil Well Cementing Company, Duncan, Oklahoma.

HALLIBURTON

YEARS AHEAD IN DRILL STEM TESTING!

why you're always right with REX®



the REX UNIT LINK *for example..*

Assures longer chain life because motion is confined to the hardened wearing parts which are designed to take it.

For all the facts, write for Bulletin 51-B

REX API CHAINS

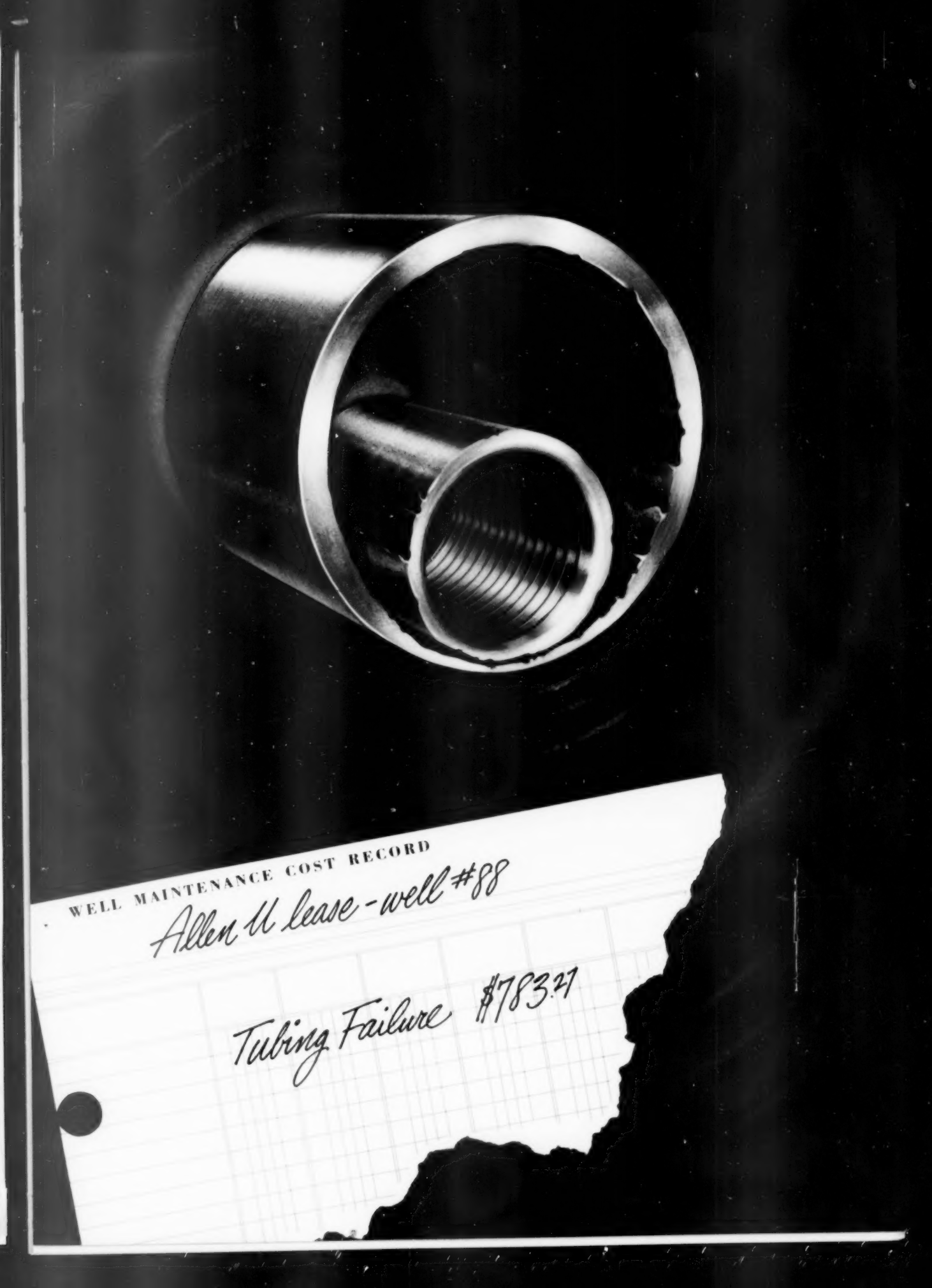
"for 40 years the greatest chains that ever hit the oil fields"

CHAIN BELT REX COMPANY®

Chain Belt COMPANY
OF MILWAUKEE
4619 W. Greenfield Ave., Milwaukee 1, Wis.

OIL FIELD SALES OFFICES
New York • Tulsa • Dallas • Houston • Midland • Los Angeles

Distributors located in principal cities in the United States and throughout the world
Export Offices: Milwaukee and 19 Rector St., New York City


WELL MAINTENANCE COST RECORD
Allen U lease - well #88
Tubing Failure $783.27

Allen U. Lease - well #8

Tubing Failure $178.37

The odds are 100 to 1 this tubing failure could have been prevented with...

oilmaster

HARD FACED ROD GUIDES

Write for descriptive literature

FLUID PACKED PUMP COMPANY

MAIN OFFICE AND PLANT, LOS NIETOS, CALIFORNIA

Distributed by The National Supply Co., Pittsburgh, Pa.

Export: The National Supply Export Corp., 30 Rockefeller Plaza, New York

Co-Distributors: Berry Supply Store, Beacon Supply Co., Industrial Supply Co.

oilmaster PUMPS

FOREMOST IN THE INDUSTRY

a team that delivers!

COMPLETE ALUMINUM WAREHOUSE STOCKS, READY TO GO! FASTENINGS, TUBES, EXTRUSIONS, PIPE, ROD, WIRE, PLATE, AND SHEET.

Looking for a fast relay of aluminum to assist in your race against tough production schedules? Select the Alcoa-Metal Goods Corporation combination to help you hold the winning pace.

In Alcoa you have one of the world's best qualified teammates—the first and foremost producer of quality aluminum in America.

In Metal Goods Corporation you have 7 warehouses and 12 sales service offices strategically located to give you the super service you need.

Give your nearest Metal Goods Corporation representative the opportunity to prove the advantages of letting this Alcoa-Metal Goods team handle your aluminum needs.

Please call, wire, or write the Metal Goods Corporation representative nearest you:

OFFICES AND WAREHOUSES

St. Louis 15, Missouri
5239 Brown Avenue
Nelson L. Hower
Phone: GOodfellow 1234

Tulsa 3, Oklahoma
302 North Boston
Scott J. Harrison
Phone: 4-4101

Kansas City 16, Mo.
1300 Burlington
Frank D. Hogan
Phone: NOrclay 3516

Denver 2, Colorado
2425 Walnut Street
Neal Dahn
Phone: AComa 5891

Dallas 9, Texas
6211 Cedar Springs Rd.
Sam D. Hodgdon
Phone: ELmhurst 3271

Houston 3, Texas
711 Milby Street
Harris T. Gregg
Phone: CEntral 8881

New Orleans 12, La.
432 Julia Street
Carl T. Wedemeyer
Phone: CAnal 7373

SALES SERVICE OFFICES

Wichita, Kansas
2200 East Central
Ray Haller
Phone: 7-8921

Jackson, Mississippi
781 Raymond Road
George E. Akerberg
Phone: 5-2711

Baton Rouge, Louisiana
4419 Mimosa Street
Paul P. Vidovic
Phone: 4-4738

Omaha, Nebraska
3515 No. 67th Avenue
C. M. Cooley
Phone: WAlnut 1112

Memphis, Tennessee
713 Columbian Mutual Tower Bldg.
Robert W. Downs
Phone: 5-8721

San Antonio, Texas
2012 Alamo Natl. Bldg.
Robert E. Reese
Phone: GArfield 3161

Davenport, Iowa
924 State Street
Robert L. Tharp
Phone: 2-3156

Decatur, Illinois
1305 West Sunset
Arlie W. Tempel
Phone: 8-1314

Indianapolis 2, Ind.
1333 N. Pennsylvania
Harry L. Newton
Phone: Lincoln 4980

Beaumont, Texas
238 Bowie Bldg.
Lee T. Dodson
Phone: 4-7536, 4-7537

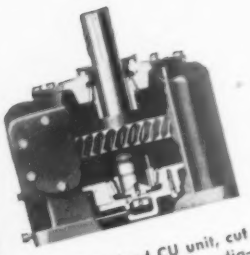
Fort Worth, Texas
3821 Carolyn
John M. Turbitt
Phone: FOrtune 4369

Corpus Christi, Texas
Room 301-02 Wilson Bldg.
Roy D. Bagaley
Phone: 4-0366

METAL GOODS CORPORATION

DISTRIBUTORS FOR ALUMINUM COMPANY OF AMERICA

GENERAL OFFICES: ST. LOUIS 15, MISSOURI



The Cleveland CU unit, cut away to show large diameter fan shaft, tapered roller bearings on gear shaft and piston type lubricating pump. Cleveland worms and gears, fabricated of specially selected alloys, have high shock resistance.

CLEVELAND drive takes the heat off a gas booster

TAKE a look at a familiar sight. This Cleveland CU worm gear speed reducer is driving a cooling tower fan to take the heat off compressed gas at a Kansas booster station.

Cleveland CUs are familiar in the gas and oil country because they excel at driving heavy-duty fans for long, continuous, trouble-free periods under all weather conditions.

In a Cleveland CU unit, a case-hardened steel worm operates on a long-wearing, nickel-bronze gear. Parts run in an oil bath, sealed in a dust-tight housing. The unit is so well engineered and built that it is practically shockproof and wear-free. Over 40 years of specialized worm gear knowhow stand behind it—experience which pays off in economical cooling of the thousands of Cleveland-driven heat exchangers now operating in the oil and gas industry.

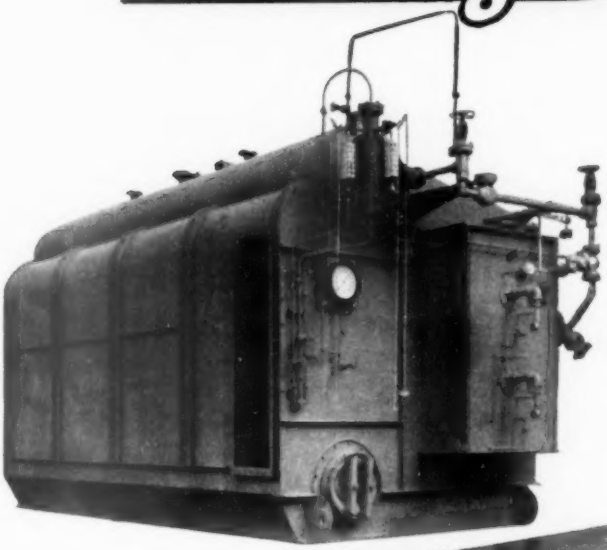
For full description and engineering data, write today for new Catalog 400. The Cleveland Worm & Gear Company, 3286 East 80th Street, Cleveland 4, Ohio.

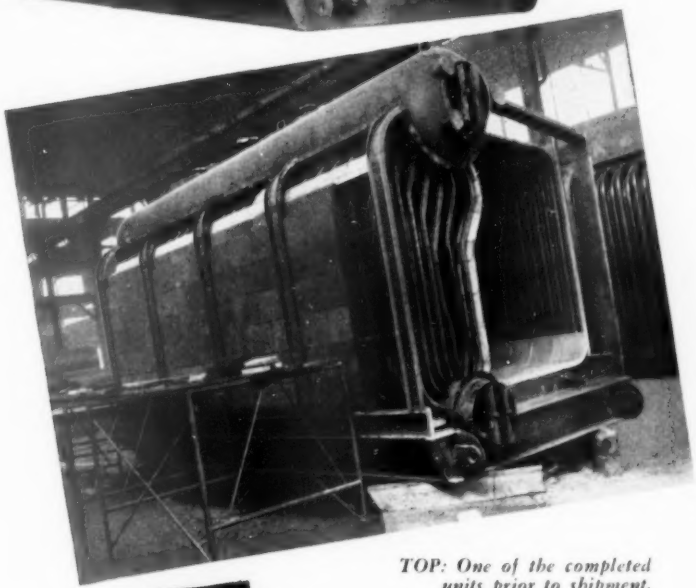
Affiliate: The Farval Corporation, Centralized Systems of Lubrication. In Canada: Peacock Brothers Limited.

CLEVELAND
Worm Gear
Speed Reducers

Vogt

Gas Fired
PACKAGE UNIT
Steam Generators
selected by
PHILLIPS CHEMICAL CO.
Pasadena, Texas Plant





TOP: One of the completed units prior to shipment.

BOTTOM: Shop erection view shows tile and block insulation in convection wall; also main baffle tile and furnace floor tile.

Principal Data, Each Unit

25,000 pounds steam per hour capacity. Induced draft type.

Fusion welded steam and water drums designed for 425 pound S.W.P.

Completely shop assembled and required only the piping and gas outlet connections to place them in operation.

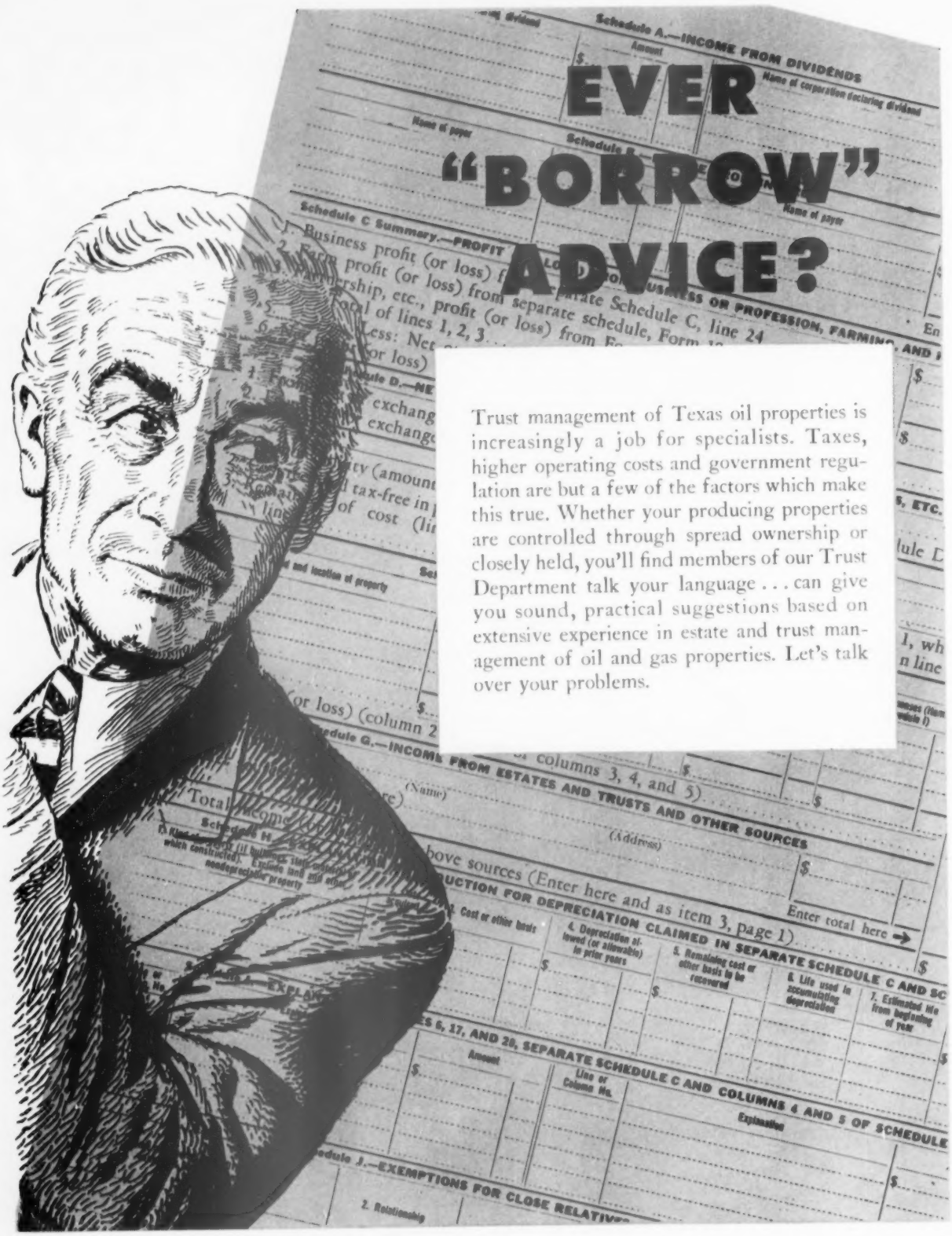
Fully steel encased for outdoor installation on a simple foundation.

•

**Vogt Steam Generators are available in bent tube types and straight tube forged sectional header types for solid, liquid or gaseous fuels. Bulletins on request.*

HENRY VOGT MACHINE CO.
Louisville, Kentucky

BRANCH OFFICES: New York, Philadelphia, Chicago, Cleveland, St. Louis, Dallas, Charleston, W. Va.


EVER
"BORROW"
ADVICE?
Trust management of Texas oil properties is increasingly a job for specialists. Taxes, higher operating costs and government regulation are but a few of the factors which make this true. Whether your producing properties are controlled through spread ownership or closely held, you'll find members of our Trust Department talk your language . . . can give you sound, practical suggestions based on extensive experience in estate and trust management of oil and gas properties. Let's talk over your problems.

MERCANTILE NATIONAL BANK
AT DALLAS

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

Axelson SEATS AND BALLS

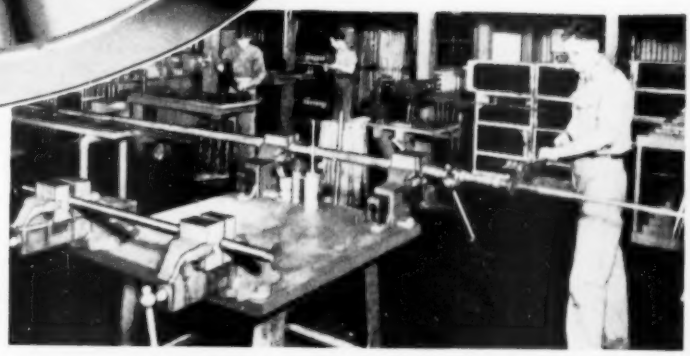
MATCHED and vacuum tested.

REVERSIBLE, to last twice as long.

FIVE GRADES; you don't have to buy a tractor for a wheelbarrow job.

RIB and FLAT types, all grades.

AXLOY seats and balls of stainless steel will give you excellent service in any well. But to contend with extreme corrosion and abrasion, your J&L store will recommend AXREX. This seat and ball combination is made from centrifugal cast hard facing material. Non-magnetic.



J&L Pump Repair Shops insure your investment in Axelson pumps. Never junk an Axelson.

JONES & LAUGHLIN STEEL CORPORATION
SUPPLY DIVISION

J&L STEEL

General Offices: TULSA, OKLAHOMA

88 STORES • 19 OFFICES • 9 RESIDENT SALESMEN

EXPORT: 405 Lexington Ave., New York, N. Y., U. S. A.

Oil helps him keep us healthy...

What makes a doctor? Long years of learning, a deft pair of hands, eyes that see beneath the surface, a mind that must make life-or-death decisions in a clock's tick. Working hours: 24 a day. Responsibility: unlimited. Petroleum, so useful in so many fields, is helping the doctor, too. A lot of his "magic" aids – such as antiseptics, drugs, sedatives, dressings – are produced from this vital resource. Through continuous research and superior petroleum products, The Texas Company has long served our country's medical profession.

The Texas Company

TEXACO

"Son, y' don't have to sell me!"

"Unless you're a real old-timer with Lane-Wells, I've known their packers longer than you have. And used 'em, too.

"They've given me mighty good service, too, and less trouble than a man has a right to expect. The way they operate, it sure shows that oil country men designed 'em--men who really know what it takes. Y' can deliver my compliments to 'em!

"I might sum it up by saying that Lane-Wells packers kinda contribute to my peace of mind, because when I set one, I don't have to worry about it. I know it will do its job! That's why--

AP-606

LANE WELLS COMPANY

General Offices, Export Office, Plant • 5610 So. Soto St., Los Angeles 58

LOS ANGELES • HOUSTON • OKLAHOMA CITY • LANE-WELLS CANADIAN CO. IN CANADA • PETRO-TECH SERVICE CO. IN VENEZUELA

Tomorrow's Tools - Today!

33 Distributors for BUCYRUS-ERIE Spudders

Located in the "Hearts" of America's Cable Tool Fields

BEACON SUPPLY CO. (1) Pampa, Tex.; (2) Borger, Tex.

BECKWITH MACHINERY CO.
(3) Pittsburgh (East Liberty), Pa.; (4) Bradford, Pa.; (5) Clearfield, Pa.

BRADFORD SUPPLY CO. ..... (6) Princeton, Ind.

BUCKEYE SUPPLY CO.
(7) Zanesville, Ohio; (8) Wooster, Ohio; (9) El Dorado, Kan.; (10) Chase, Kan.

DRILLERS SUPPLY CO. ..... (11) Joplin, Mo.

DRILLING & MINING EQUIPMENT CO.
(12) Los Angeles, Calif.

GREAT NORTHERN TOOL & SUPPLY CO.
(13) Billings, Mont.; (14) Cut Bank, Mont.; (15) Kevin, Mont.; (16) Casper, Wyo.

IVERSON SUPPLY CO.
(17) Tulsa, Okla.; (18) Oklahoma City, Okla.; (19) Okmulgee, Okla.; (20) Ft. Worth, Tex.; (21) Midland, Tex.; (22) Odessa, Tex.; (23) Snyder, Tex.; (24) Artesia, N.M.; (25) Farmington, N.M.

McJUNKIN CORPORATION
(26) Charleston, W.Va.; (27) Allen, Ky.

OLYMPIC SUPPLY CO. ..... (28) Seattle, Wash.

THE STRAKER SUPPLY ..... (29) Mount Pleasant, Mich.

*BUCYRUS-ERIE Sales Offices

CANADA

LUCEY CANADIAN SUPPLY CO. (30) Calgary, Alta.; (31) Edmonton, Alta.

NEWFOUNDLAND TRACTOR & EQUIPMENT CO.
(32) St. John's, Nfld.

TILLSONBURG PIPE & SUPPLY CO.
(33) Tillsonburg, Ont.

7553

BUCYRUS ERIE

SOUTH MILWAUKEE, WISCONSIN

*EVANSVILLE, IND. • *DALLAS, TEX. • *ENGLEWOOD, N.J.

Lay sour crude pipe with 62% less labor cost

Easy-handling Tenite pipe means substantial installation economies. In a typical case, three men laid 4000 feet of 4" Tenite pipe a day; eight men are usually required to handle the same amount of steel pipe.

Extruded of Eastman cellulose acetate butyrate plastic, Tenite pipe does not corrode under oil-field conditions. Major oil producers are successfully using it for sour crudes, salt water disposal, and in areas where electrolytic action affects steel pipe.

Because of Tenite's extra-smooth walls, paraffin has never clogged a Tenite pipe line. For any given head loss Tenite pipe also delivers approximately 40% more fluid than clean steel pipe of the same diameter.

Pipe extruded of Tenite is made by various companies to which Eastman supplies the plastic compound. Send the coupon for further information about Tenite plastic pipe. If you need assistance in adapting Tenite pipe to your operation, our technical staff will be glad to help.

For corrosion resistance ask for PIPE MADE OF—

TENITE

an Eastman Plastic

•EASTMAN CHEMICAL PRODUCTS, INC.
Sales representative for
TENNESSEE EASTMAN COMPANY
Division of Eastman Kodak Company
KINGSPORT, TENNESSEE

EASTMAN CHEMICAL PRODUCTS, INC.
DEPT. I, KINGSPORT, TENNESSEE

Please send me further information about TENITE PLASTIC PIPE

NAME.....

TITLE.....

COMPANY.....

STREET.....

CITY.....STATE.....

CEMENT SETS BETTER IN HORIZONTAL GROOVES

when wells are scraped with

HALLIBURTON'S ROTO WALL CLEANERS

Dangerous vertical channeling is reduced sharply when these effective Roto Wall Cleaners groove out mud cake in a 360 degree horizontal arc. Cement sets in clean, laminated rings as the casing is rotated—sets better for a tighter bond between wall and pipe.

Halliburton's Roto Wall Cleaners come in standard five foot sections. Each has 44 spring steel spikes of high tensile strength. Their scraping action permits a free flow of fluid in the annulus, with no chance of bridging. And their triple-coiled flexibility allows full circle cleaning action without bending or breaking.

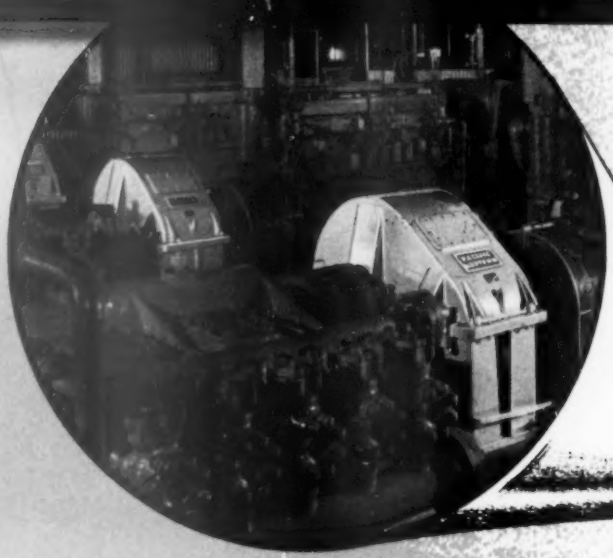
Adaptability is another important quality of these exclusive Halliburton Cleaners. Sections can be tack-welded to the casing in any arrangement required by the job in hand. And only one size cleaner is needed for all casing jobs.

Next time, take advantage of Halliburton's million job experience. Use Roto Wall Cleaners to secure better cementing; to minimize the need for remedial squeeze jobs. Phone your nearby Halliburton representative. Or contact Halliburton Oil Well Cementing Company, Duncan, Okla.

YEARS AHEAD IN IMPROVED CEMENTING TECHNIQUES

HALLIBURTON

Along the Union Oil Pipelines it's WESTERN GEAR for REDUCERS



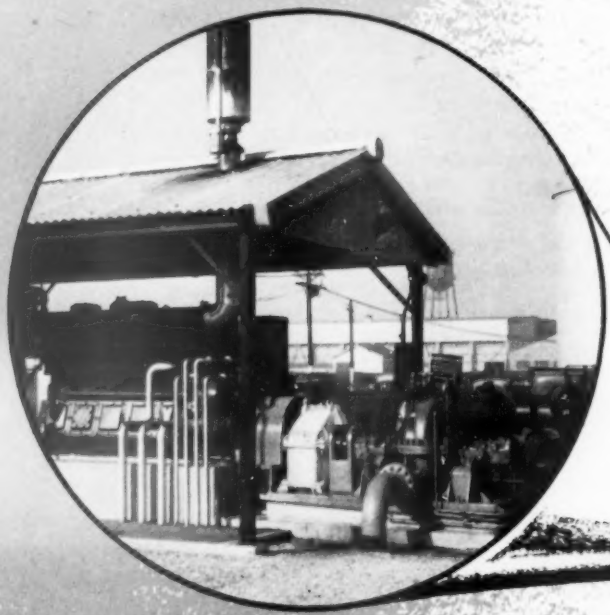
Reducers for Union Oil's Antelope pumping station

Sixty-five years of experience in the design and production of gears, plus the facilities of five modern plants, enable Western Gear Works to fill the need for standard or special gears and gear units on any pipeline pumping job. Quiet dependability and a minimum of maintenance under heavy-duty, day-in and day-out continuous load, is the reason for Western Gear Works' widespread acceptance in this field.

For your information . . . New pipeline gear drive Bulletin No. 5204 will be sent upon request . . . on your letterhead.

Reducers for one of Union Oil's Northern Division pipeline pumping stations

AD NO. 5311



Reducer for Union Oil's Torrance station

Our 65th year

WESTERN GEAR WORKS

Manufacturers of **PACIFIC-WESTERN** Gear Products

Pacific Gear & Tool Works

Plants: Seattle, San Francisco, Belmont (S. F. Peninsula), Lynwood (Los Angeles County), Houston

Write, wire or phone your nearest Pacific-Western office

Plants— 417 Ninth Ave. S., Seattle 4, Washington
2600 E. Imperial Highway, Lynwood (Los Angeles County), California
1035 Folsom St., San Francisco 3, California
Belmont (San Francisco Peninsula), California
117 N. Palmer St., Houston 3, Texas

Representatives— N. 2605 Division St., Spokane, Washington
930 S. E. Oak St., Portland 14, Oregon
Room 212, Ross Bldg., Denver 2, Colorado
500 South Ervay Street, Dallas, Texas
Engineering & Machinery Ltd., 1366 W. Broadway, Vancouver, B. C.

When check valves cause frequent round-tripping . . . use Kennametal

Kennametal Sintered Carbide Balls and Seats used in oil well check valving give over 20 times longer service than alloy-steel because they have superior resistance to shock, sand-cutting, corrosion and pitting. Round trips are less frequent —production increases.

Bottom-hole valving efficiency is maintained because of Kennametal's diamond-like hardness. Wear- and corrosion-resistance of this sintered carbide provides unexcelled performance in sand, sour crude, hydrogen sulfides, water, and gas cut fluids.

Many fields are increasing production and lowering maintenance costs by standardizing on Kennametal Balls and Seats. Leading pump manufacturers incorporate them as standard equipment.

Kennametal API Balls and Seats (both flat and rib styles) are stocked and sold by your regular supplier.

KENNAMETAL®

PUTS AN END TO DOWN-THE-HOLE CHECK VALVE TROUBLE

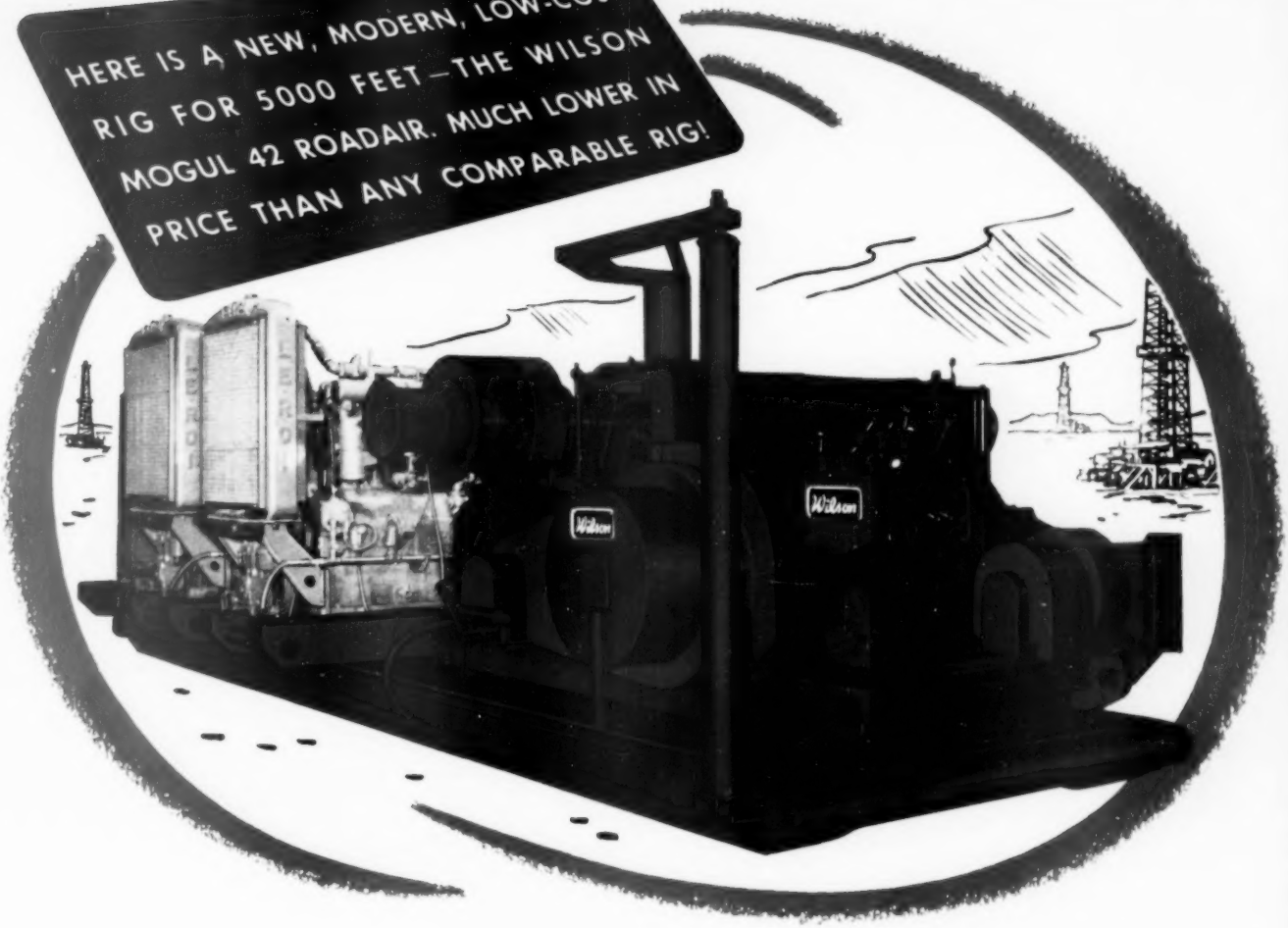
Quality Sintered Carbide API Balls and Seats

Manufactured by

Kennametal Inc., Latrobe, Pa.

SOLD BY YOUR REGULAR SUPPLIER

HERE IS A NEW, MODERN, LOW-COST RIG FOR 5000 FEET—THE WILSON MOGUL 42 ROADAIR. MUCH LOWER IN PRICE THAN ANY COMPARABLE RIG!



"after all—the only thing we're talking about is MONEY"

The Mogul Roadair "42" Rig was designed to meet the need of those customers who want a rig *with compounded engines* of up to 400 H.P. total, to drill wells up to 5000 feet with 4½" pipe, without torque converters, and at the lowest total cost. This rig more completely fills all of these requirements than any rig we know. Of the 400 engine horsepower, 300 can be used on the pump and about 100 on the rotary table, and yet all 400 H.P. will be available when coming out of the hole.

The rig also has the safety and dependability inherent in having two engines, with compound, so that either can be used in the event of failure of the other. The V-belt compound is designed to use the high strength steel cord V-belts, which are run at fairly high speed, to carry relatively large H.P. in a narrow width.

It is equipped with a 118 Air-Tube disc engine clutch in a positively aligned clutch housing, which has proved so successful in other Wilson Roadair and Torcair Rigs.

The drum assembly in this rig is exactly like the regular Mogul Torcair "42" rig, which has two friction clutch drum speeds. But in addition it has a two speed jaw clutch transmission in a heavy plate case. The brake rings are "42" diameter, and brakes are 8" wide, full wrap type and cam and roller operated.

This is a fast, dependable rig, at the lowest possible cost, that will make possible *lower drilling costs than any other rig of comparable size!*

Compare Features... Quality... Prices

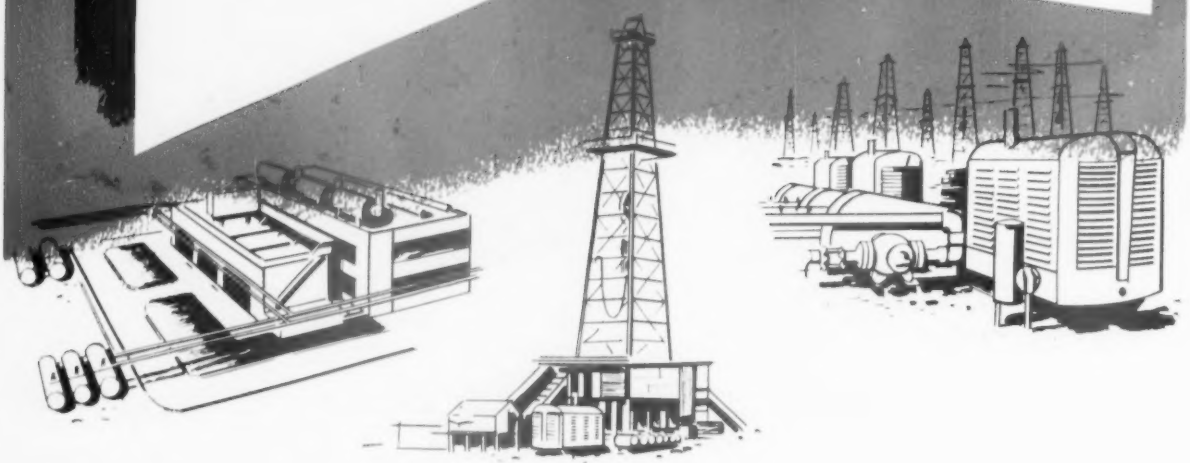
Wilson MANUFACTURING CO., Inc.

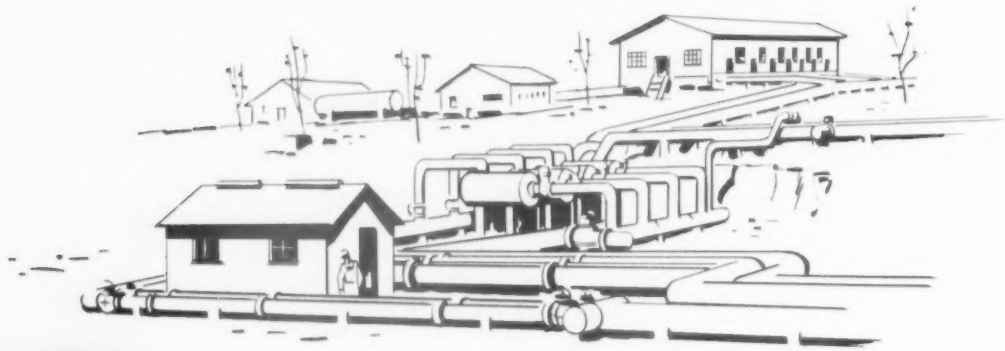
WICHITA FALLS, TEXAS

Marquette

HYDRAULIC GOVERNORS

Constantly gaining prominence throughout the industry for dependable speed regulation of Diesel and gas engines





PROTECTED BY U.S. AND FOREIGN PATENTS AND PATENTS PENDING

The Marquette METAL PRODUCTS CO.

CLEVELAND 10, OHIO

SUBSIDIARY OF CURTISS-WRIGHT CORPORATION

Also Manufacturers of:

ROLLER BEARING TEXTILE SPINDLES
WINDSHIELD WIPERS FOR AIRCRAFT
FUEL OIL PUMPS AND INJECTORS
PRECISION PARTS AND ASSEMBLIES
ROTARY HIGH PRESSURE OIL FIELD PUMPING MACHINERY

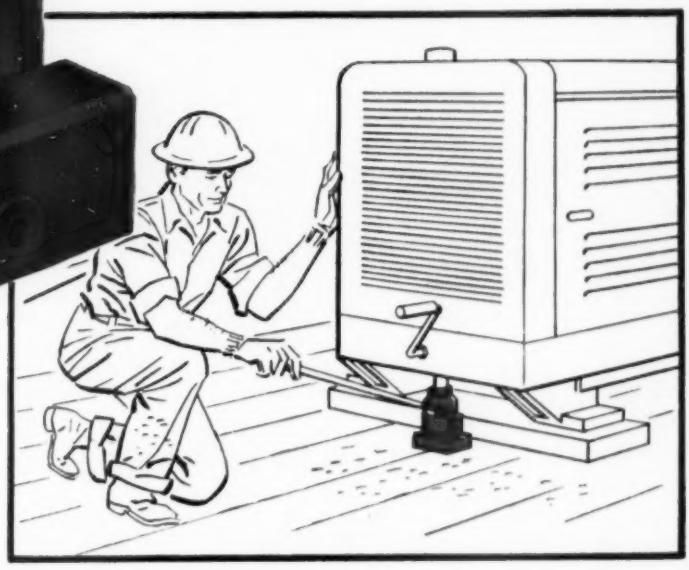
This modern jack can lift heavier loads with less effort!

This precision built jack requires much less effort to operate than mechanical type jacks because it utilizes the hydraulic principle—a pump does the work.

Duff-Norton Hy-Power Hydraulic Jacks, because of this ease of operation, are finding more widespread use in the oil fields for all kinds of heavy lifting and pushing jobs. They are standard equipment on many rig builders' trucks and on drilling rigs.

The hydraulic jack illustrated (No. 25H9) can lift 25 tons up to 6 inches. It is only 9⅛ inches high when closed and weighs only 38 lbs. There are nine other models of Duff-Norton Hydraulic Jacks with capacities from 3 to 50 tons. All models can be equipped with gauges calibrated to show exact weight of load being lifted.

See these time and energy saving hydraulic jacks at your favorite supply store or write the world's oldest and largest manufacturer of lifting jacks for complete specifications. Ask for Hy-Power Hydraulic Jack Bulletin AD16-B, The Duff-Norton Manufacturing Co., P.O. Box 1889, Pittsburgh 30, Pa. Canadian plant —Toronto 6, Ontario.



DUFF-NORTON *Jacks*

"Giving Industry A Lift Since 1883"

for primary and secondary recovery

by any method!

choose from National's complete line

of Production Equipment

National Supply's continual development of production equipment, over the decades of service to the petroleum industry, has resulted in one of the most complete lines of recovery equipment in the oil country.

As an example, National Pumping Units are manufactured in 38 standard combinations, with API walking beam ratings from 3200 lbs. to 32,400 lbs. Available also are special long stroke pumping units designed for higher volume pumping in secondary recovery operations.

As an example, National's exclusive Plunger Lift, which utilizes natural reservoir gas pressure for more efficiently producing weak flowing wells and for low cost pumping in wells where paraffin deposits, emulsion, bottom hole water and scale accumulation hampers rod-pumping efficiency.

As an example, National's new F-90 Triplex Pump, specifically designed for water-flooding operations—yet ideally suited for salt-water disposal, high-pressure testing, gathering, formation fracturing, acidizing . . . or as power-oil source for subsurface hydraulic pumping systems.

As an example, National's top quality Sucker Rods, manufactured in three grades to meet all pumping conditions . . . and produced under the most exacting metallurgical and manufacturing standards in the industry.

Whatever methods of recovery operations you employ, be sure to get all of the profitable facts on the complete National Blue Line of production equipment. Product bulletins are available on request at your nearest National Supply Store.

THE NATIONAL SUPPLY COMPANY

PITTSBURGH 30, PENNSYLVANIA

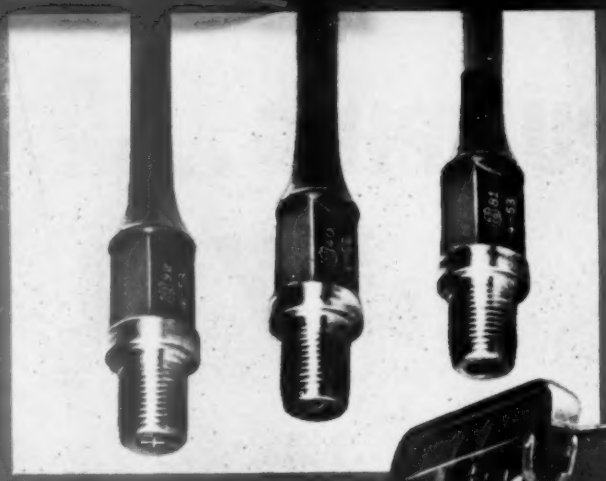
Division Offices: Denver; Ft. Worth; Houston; Pittsburgh; Tulsa; Torrance

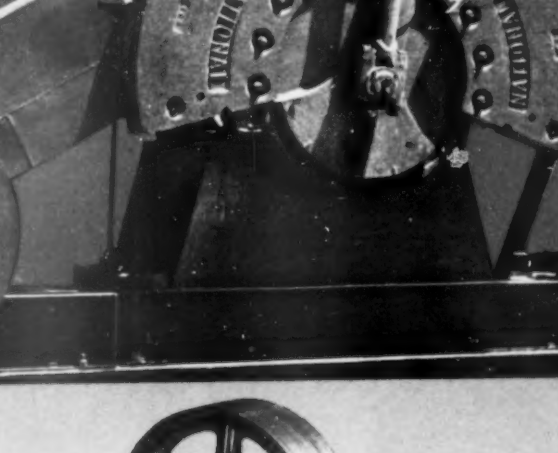
Canada: The National Supply Company, Ltd., 200 F. W. Clark Building, 709 Eighth Avenue, West, Calgary, Alberta

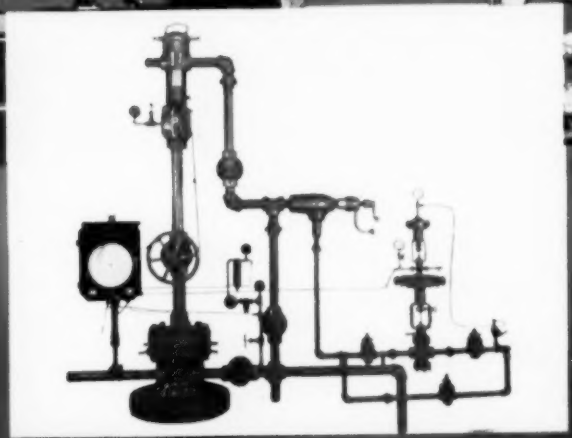
Export: 600 Fifth Avenue, New York 20, N.Y., U.S.A.; River Plate House, 12 South Place, London E.C. 2

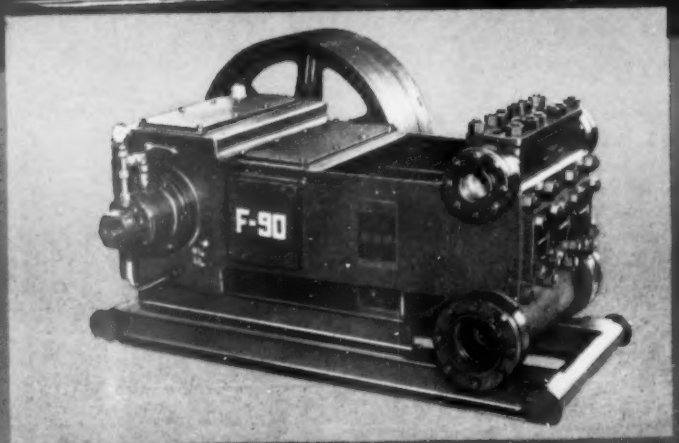
NATIONAL BLUE PRODUCTS

NATIONAL OIL FIELD MACHINERY AND EQUIPMENT









SPANG STEEL PIPE • SUPERIOR & ATLAS ENGINES

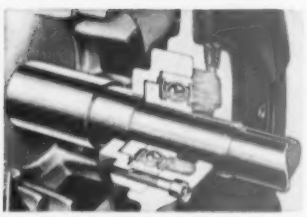
FOR OIL-WELL PUMPING...

"All motors are NOT alike!"

RELIANCE
Precision-Built
MOTORS

Typical Reliance Splashproof Motor designed for oil-well pumping service. All other standard enclosures available, with wide choice of mechanical and electrical designs and special mountings. Ratings from ¼ to 300 hp.

- ☆ Heavy shafts . . . bearing to bearing
- ☆ Indestructible pressure-cast rotors
- ☆ Shock-resistant frame and bearing-bracket construction



. . . AND THE BEST PRE-LUBRICATED BEARING DESIGN

The Reliance pre-lubricated bearing provides *four times more operating hours without re-lubrication* than any other bearing used in motors today. And—whatever your lubrication schedule—*you just can't grease 'em wrong!* To get the complete "inside story" on motor bearings, write today for Bulletin B-2201. It contains hard facts on the advantages of the Reliance pre-lubricated bearing design, with cutaway view, cross-section diagram, comparison chart, and statements by bearing manufacturers. B-1458B

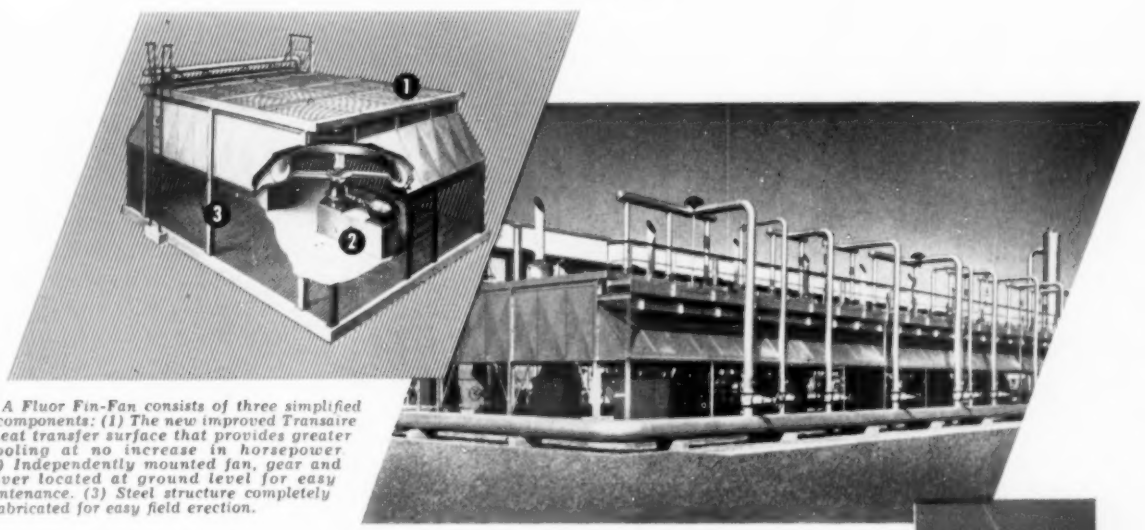
RELIANCE ELECTRIC AND ENGINEERING CO.

1120 Ivanhoe Road, Cleveland 10, Ohio • *Sales Representatives in Principal Cities*

For low cost waste heat removal investigate **Fluor Fin-Fan!**

For economical dissipation of heat loads from liquids and gases, the Fluor Fin-Fan air-cooled heat exchanger is your answer. It is highly versatile, adaptable to a wide range of duties and capacities, serves in any climate independent of wind and water conditions, and is designed for any cooling requirement where final fluid temperature is higher than dry bulb air temperature.

Fluor Fin-Fans are used in a multitude of applications on gas transmission lines, in petroleum refineries, light hydrocarbon processing plants, chemical processing plants, power and related industrial plants of many descriptions. They are designed for cooling services involving pressures up to 5000 psi and at temperatures to 1500° F. The Fluor Fin-Fan is the ultimate in simplicity, structurally and mechanically. Each unit is individually sized for each heat transfer problem and can be single pass or multi-pass, single cell or multi-cell, connected in series for long temperature ranges, in parallel for large capacities, or in combinations to best suit the cooling need.



A Fluor Fin-Fan consists of three simplified components: (1) The new improved Transaire heat transfer surface that provides greater cooling at no increase in horsepower (2) Independently mounted fan, gear and driver located at ground level for easy maintenance. (3) Steel structure completely prefabricated for easy field erection.

Gas cooling at a compressor station on a Texas pipeline.

Write today for a copy of our new illustrated booklet describing the Fluor Fin-Fan in detail—Bulletin FF-FD-0.001.

BE SURE WITH **FLUOR**

THE FLUOR CORPORATION, LTD.
LOS ANGELES 22, CALIFORNIA

FOREIGN: FACTS-FLUOR-PARIS
FLUOR OF CANADA-TORONTO
FLUOR INTERNATIONAL-BEIRUT
HEAD WRIGHTSON-LONDON

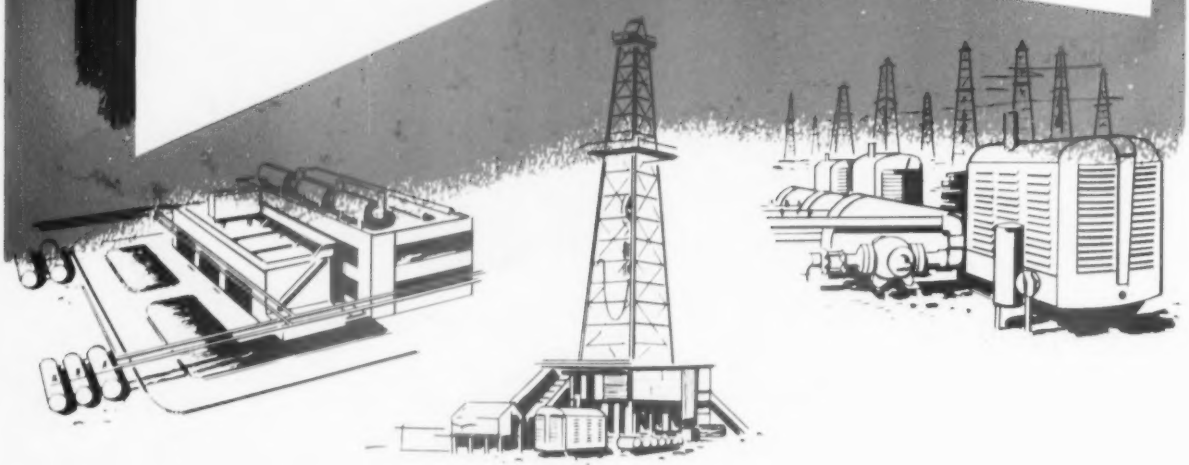
ENGINEERS
CONSTRUCTORS
MANUFACTURERS

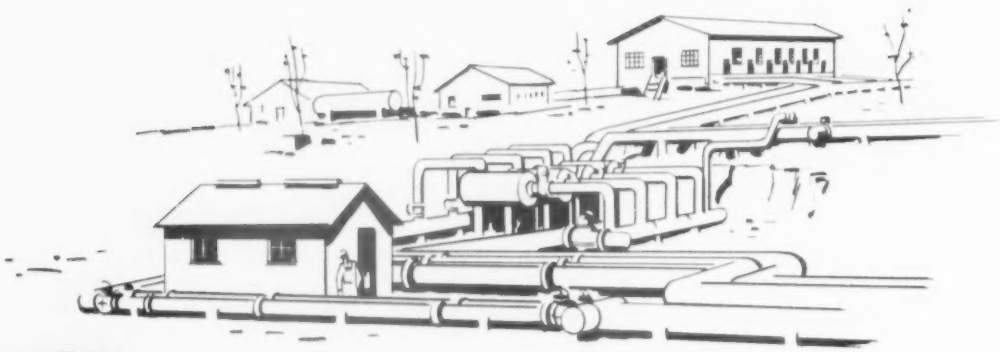
NEW YORK
CHICAGO
BOSTON
PITTSBURGH
SAN FRANCISCO
HOUSTON
BIRMINGHAM
TULSA

Marquette

HYDRAULIC GOVERNORS

Constantly gaining prominence throughout the industry for dependable speed regulation of Diesel and gas engines





PROTECTED BY U S. AND FOREIGN PATENTS AND PATENTS PENDING

The Marquette METAL PRODUCTS CO.

CLEVELAND 10, OHIO

SUBSIDIARY OF CURTISS-WRIGHT CORPORATION

Also Manufacturers of:

ROLLER BEARING TEXTILE SPINDLES
WINDSHIELD WIPERS FOR AIRCRAFT
FUEL OIL PUMPS AND INJECTORS
PRECISION PARTS AND ASSEMBLIES
ROTARY HIGH PRESSURE OIL FIELD PUMPING MACHINERY

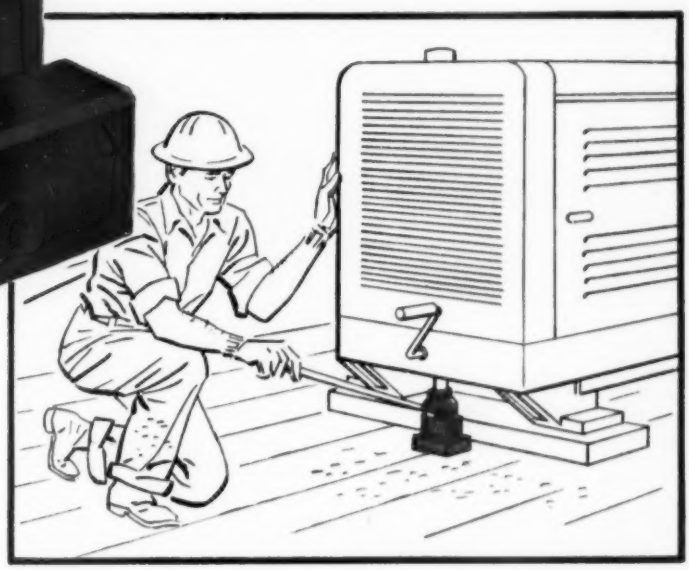
This modern jack can lift heavier loads with less effort!

This precision built jack requires much less effort to operate than mechanical type jacks because it utilizes the hydraulic principle—a pump does the work.

Duff-Norton Hy-Power Hydraulic Jacks, because of this ease of operation, are finding more widespread use in the oil fields for all kinds of heavy lifting and pushing jobs. They are standard equipment on many rig builders' trucks and on drilling rigs.

The hydraulic jack illustrated (No. 25H9) can lift 25 tons up to 6 inches. It is only 9⅜ inches high when closed and weighs only 38 lbs. There are nine other models of Duff-Norton Hydraulic Jacks with capacities from 3 to 50 tons. All models can be equipped with gauges calibrated to show exact weight of load being lifted.

See these time and energy saving hydraulic jacks at your favorite supply store or write the world's oldest and largest manufacturer of lifting jacks for complete specifications. Ask for Hy-Power Hydraulic Jack Bulletin AD16-B, The Duff-Norton Manufacturing Co., P.O. Box 1889, Pittsburgh 30, Pa. Canadian plant —Toronto 6, Ontario.



DUFF-NORTON *Jacks*

"Giving Industry A Lift Since 1883"

for primary and secondary recovery

by any method!

choose from National's complete line

of Production Equipment

National Supply's continual development of production equipment, over the decades of service to the petroleum industry, has resulted in one of the most complete lines of recovery equipment in the oil country.

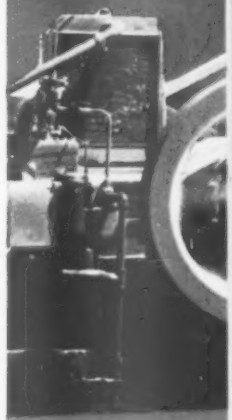
As an example, National Pumping Units are manufactured in 38 standard combinations, with API walking beam ratings from 3200 lbs. to 32,400 lbs. Available also are special long stroke pumping units designed for higher volume pumping in secondary recovery operations.

As an example, National's exclusive Plunger Lift, which utilizes natural reservoir gas pressure for more efficiently producing weak flowing wells and for low cost pumping in wells where paraffin deposits, emulsion, bottom hole water and scale accumulation hampers rod-pumping efficiency.

As an example, National's new F-90 Triplex Pump, specifically designed for water-flooding operations—yet ideally suited for salt-water disposal, high-pressure testing, gathering, formation fracturing, acidizing . . . or as power-oil source for subsurface hydraulic pumping systems.

As an example, National's top quality Sucker Rods, manufactured in three grades to meet all pumping conditions . . . and produced under the most exacting metallurgical and manufacturing standards in the industry.

Whatever methods of recovery operations you employ, be sure to get all of the profitable facts on the complete National Blue Line of production equipment. Product bulletins are available on request at your nearest National Supply Store.



THE NATIONAL SUPPLY COMPANY

PITTSBURGH 30, PENNSYLVANIA

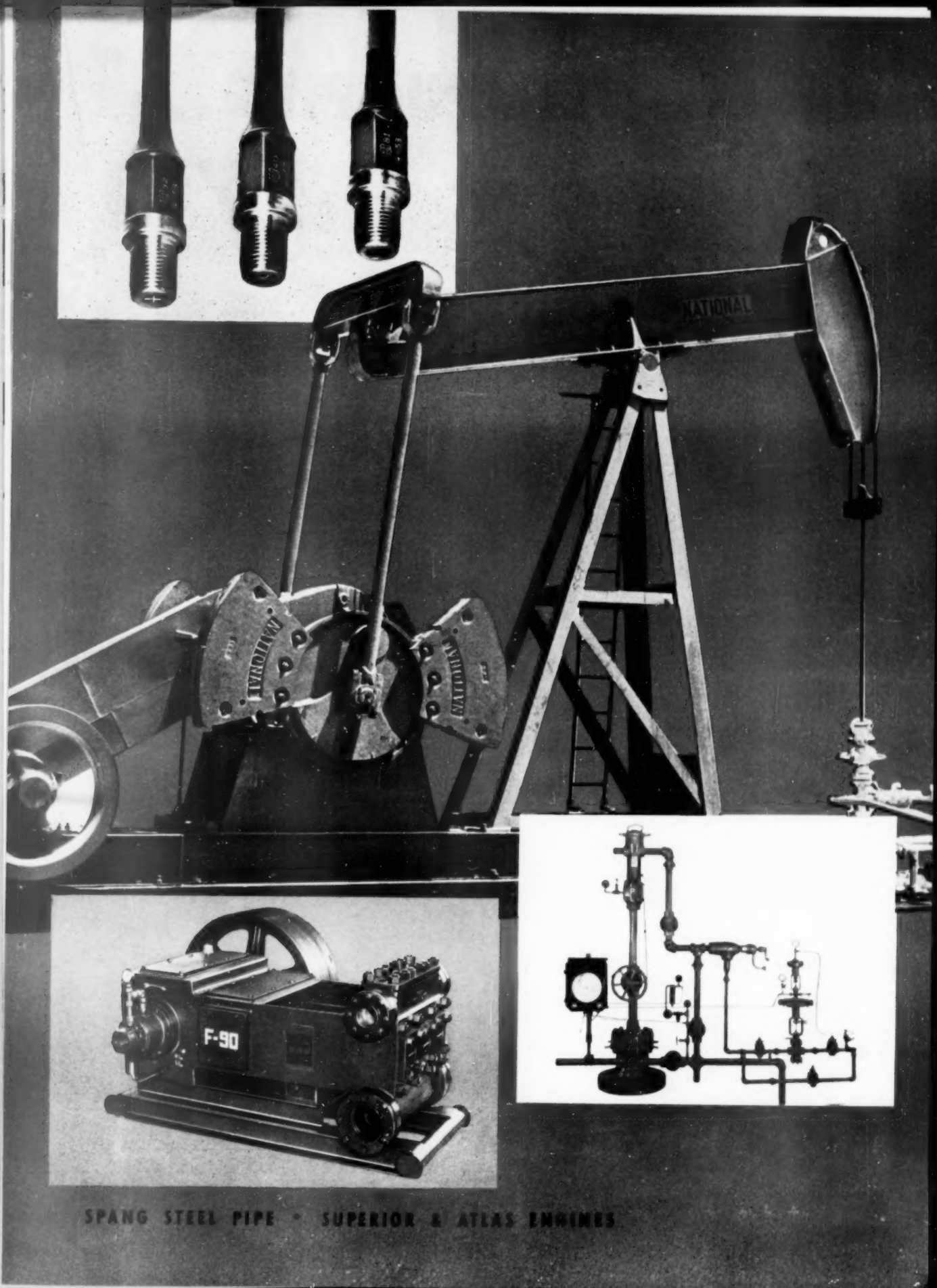
Division Offices: Denver; Ft. Worth; Houston; Pittsburgh; Tulsa; Torrance

Canada: The National Supply Company, Ltd., 200 F. W. Clark Building, 709 Eighth Avenue, West, Calgary, Alberta

Export: 600 Fifth Avenue, New York 20, N.Y., U.S.A.; River Plate House, 12 South Place, London E.C. 2

NATIONAL BLUE PRODUCTS

NATIONAL OIL FIELD MACHINERY AND EQUIPMENT



SPANG STEEL PIPE • SUPERIOR & ATLAS ENGINES

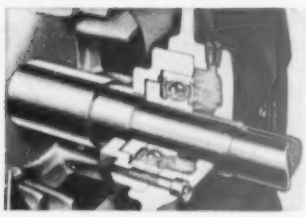
FOR OIL-WELL PUMPING...

"All motors are NOT alike!"

RELIANCE
Precision-Built
MOTORS

Typical Reliance Splashproof Motor designed for oil-well pumping service. All other standard enclosures available, with wide choice of mechanical and electrical designs and special mountings. Ratings from ¼ to 300 hp.

- ☆ Heavy shafts . . . bearing to bearing
- ☆ Indestructible pressure-cast rotors
- ☆ Shock-resistant frame and bearing-bracket construction



. . . AND THE BEST PRE-LUBRICATED BEARING DESIGN
The Reliance pre-lubricated bearing provides *four times more operating hours without re-lubrication* than any other bearing used in motors today. And—whatever your lubrication schedule—*you just can't grease 'em wrong!* To get the complete "inside story" on motor bearings, write today for Bulletin B-2201. It contains hard facts on the advantages of the Reliance pre-lubricated bearing design, with cutaway view, cross-section diagram, comparison chart, and statements by bearing manufacturers. B-1456B

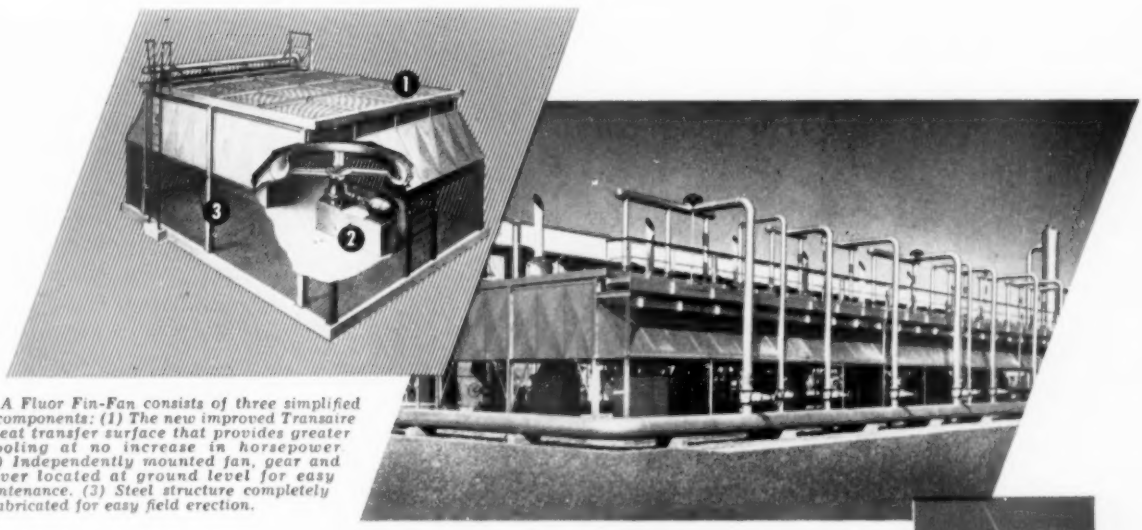
RELIANCE ELECTRIC AND ENGINEERING CO.

1120 Ivanhoe Road, Cleveland 10, Ohio • *Sales Representatives in Principal Cities*

For low cost waste heat removal investigate ***Fluor Fin-Fan!***

For economical dissipation of heat loads from liquids and gases, the Fluor Fin-Fan air-cooled heat exchanger is your answer. It is highly versatile, adaptable to a wide range of duties and capacities, serves in any climate independent of wind and water conditions, and is designed for any cooling requirement where final fluid temperature is higher than dry bulb air temperature.

Fluor Fin-Fans are used in a multitude of applications on gas transmission lines, in petroleum refineries, light hydrocarbon processing plants, chemical processing plants, power and related industrial plants of many descriptions. They are designed for cooling services involving pressures up to 5000 psi and at temperatures to 1500° F. The Fluor Fin-Fan is the ultimate in simplicity, structurally and mechanically. Each unit is individually sized for each heat transfer problem and can be single pass or multi-pass, single cell or multi-cell, connected in series for long temperature ranges, in parallel for large capacities, or in combinations to best suit the cooling need.



A Fluor Fin-Fan consists of three simplified components: (1) The new improved Transaire heat transfer surface that provides greater cooling at no increase in horsepower (2) Independently mounted fan, gear and driver located at ground level for easy maintenance. (3) Steel structure completely prefabricated for easy field erection.

Gas cooling at a compressor station on a Texas pipeline.

Write today for a copy of our new illustrated booklet describing the Fluor Fin-Fan in detail—Bulletin FF-FD-0.001.

BE SURE WITH **FLUOR**

THE FLUOR CORPORATION, LTD.
LOS ANGELES 22, CALIFORNIA

FOREIGN FACTS-FLUOR-PARIS
FLUOR OF CANADA-TORONTO
FLUOR INTERNATIONAL-BEIRUT
MEAD WRIGHTSON-LONDON

ENGINEERS
CONSTRUCTORS
MANUFACTURERS

NEW YORK
CHICAGO
BOSTON
PITTSBURGH
SAN FRANCISCO
HOUSTON
BIRMINGHAM
TULSA

ROCKWELL LUBRICANTS IN TUBES

Already A Success!

GUN LUBRICANT TUBE
Available in boxes of six

Demonstrating convenience of filling a lubricant gun with the Rockwell gun tube.

BULK LUBRICANT TUBE

Available in boxes of four or eight

Are You Using Them?

LUBRICANT TUBE KEY

Supplied with each lubricant tube

The new Rockwell lubricant tubes for Nordstrom valves were announced just last March, but already our customers have discovered that Rockwell lubricant tubes are the simplest, cleanest and most economical method of valve lubrication ever devised.

For Nordstrom valves equipped with lubricant screws, just insert the tube spout in the valve shank and turn key until lubricant chamber is filled. There's no chance for dirt or grit to contaminate the lubricant.

If you lubricate Nordstrom valves by lubricant gun, specify the Rockwell gun tube. Insert it in your gun and turn key until all lubricant has been emptied into the barrel. It's easy and quick.

If you haven't tried this cleaner, more efficient method of valve lubrication, call your Nordstrom representative or supply store. Rockwell Manufacturing Company, Pittsburgh 8, Pennsylvania.

ROCKWELL Built Nordstrom Valves

Lubricant-Sealed for Positive Shut-Off

Another Product

Maintenance man demonstrating ease of lubricating a Nordstrom valve with the Rockwell lubricant tube. One tube fits all sizes and types of Nordstrom valves.

WITH

BENSON ALUMINUM DRUMS

1 Save on replacement costs! Strong, lightweight aluminum drums outlast and outperform shipping containers made of other materials . . . offer tremendous savings on replacement costs alone. They do not rust or shatter. They stand up under rough treatment. In addition, aluminum drums have a high salvage value.

2 Save on labor and material costs! With the elimination of rust problems go the tremendous labor and material expenses of applying inside enamel and sealer coatings . . . baked-on linings . . . rust-proofing . . . re-tinning . . . galvanizing . . . and other costly formulas and preventatives. You can forget drum maintenance and serv'ce and use rust-proof Benson Aluminum drums as they are for years and years.

3 Save on shipping charges! To ship a carload of glycerin in heavy-metal drums from Chicago to Philadelphia would cost $558.90 . . . in Benson Aluminum Drums it would cost only $512.95. This saving of $46 means that every eleventh carload is shipped without additional cost. Remember, too, that lightweight Benson Aluminum Drums also reduce handling costs for you and your customers.

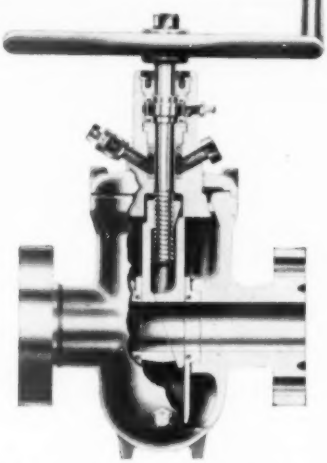
4 Save on your chemical investment! Your shipments are safe against rust, contamination and spoilage when they go in rust-proof Benson Aluminum Drums. You eliminate the possibility of costly damage suits and claims. Aluminum drums protect both your shipment and your customer good will . . . and save money and worry.

USE BENSON ALUMINUM DRUMS TO SHIP: Acids, alcohols, aniline, fats and oils, liquid fertilizers, formaldahyde, hydrazine, hydrogen peroxide, inflammables and explosives, insecticides and poisons, premium petroleum products, propellants and many other liquid products. Also, non-regulatory dry chemicals, powdered food products, naval stores, waxes, greases, soaps and other dry solids.

For further information, contact the Reynolds office listed under "Aluminum" in your classified telephone directory, or write direct to Reynolds Metals Company, 2595 South Third St., Louisville 1, Ky.

REYNOLDS ALUMINUM

EXCLUSIVE SALES AGENTS FOR BENSON CHEMICAL DRUMS



All W-K-M Valves have a perfectly smooth bore. There are no cavities or projections to cause turbulence or to collect sediment. Gates and seats are protected against cutting or damage of any kind. These advantages are a result of the W-K-M Expanding Gate development which is explained below.

In closed position, the gate (left) and segment (right) seal tightly against both seats.

When opening or closing, the gate and segment are in neutral position permitting free upward or downward movement of the gate assembly.

When open, the gate and segment again seal tightly against both seats and the bore of each lines up perfectly with the bore of the body to provide a smooth, full-round conduit.

You can ***completely*** overhaul a W-K-M Valve right on the tree in one hour! When overhauled, the valve becomes as good as new, ready for many more years of efficient, trouble-free service.

There is no need to go into great detail to point out the advantages and economies of on-the-spot repair or overhaul. Frequently the time and money saved will amount to much more than the cost of the valve.

Long run performance is far more important than first cost. When you buy, specify W-K-M and you'll be sure of satisfactory operation for the life of your tree.

W-K-M COMPANY

P. O. BOX 2117 HOUSTON 1, TEXAS

2330 E. 8TH ST., LOS ANGELES, CALIF.

EXPORT OFFICE: 30 Rockefeller Plaza, New York, N. Y.

W-K-M Valves

ALL W-K-M VALVES HAVE **Through-Conduit Fluid Passage • Parallel Expanding Gate Assembly**

Oversize Replaceable Seats • Double Row Thrust Bearings on Stem • Internal Lubrication

Cramped for space?
PUT THAT NEW PUMP OUTDOORS!

ELLIOTT Outdoor Splashproof MOTOR

IT'S DELUGE-PROOF!

Elliott outdoor splashproof motor undergoing operating test under torrents of water, going strong after hours of deluge. When disassembled, windings were found completely dry.

● Weather doesn't matter to this motor. It gives you all the immunity to climatic extremes of totally enclosed construction, without the need for the expensive and complicated ventilation provisions of that design. A series of ingenious baffles shuts out snow, rain, sleet, dust, debris, fog, salt spray, etc., permitting entrance to cooling air only. For extremely dust-laden air, filters can be provided. No cored foundation is needed — a simple slab suffices.

This motor has proven itself in hundreds of outdoor installations in all parts of the country. Sizes from 150 hp to 3000 hp and even higher. Full details in the bulletin. Contact your local Elliott representative, or write Elliott Company, Ridgway, Pa.

ELLIOTT Company

R2-25 **RIDGWAY DIVISION**

ELLIOTT ELECTRICAL EQUIPMENT INCLUDES CROCKER-WHEELER INDUSTRIAL MOTORS

IT'S NEW...FLEXIBLE...SAFER...STRONGER

STRATOLINE...

The Most Streamlined Coupling Ever Made

The new Hewitt-Robins Stratoline Coupling embodies the *strongest, smoothest construction by far ever used on any rotary drilling hose.* This new coupling, with API line pipe threads, is no bigger in diameter than the hose itself—has no protruding parts—is absolutely snag-proof, leakproof, easier to use, saves handling time.

Feature for feature, the new Hewitt-Robins Cable-Reinforced Rotary Drilling Hose with the exclusive Stratoline Coupling meets the most exacting requirements. This new rotary drilling hose is unequalled for safe, dependable, long-life performance and handling ease on any type of rotary drilling rig.

ENGINEERING DATA

CONSTRUCTION: High-tensile airplane cable wire spiraled on, right hand and left hand to equalize tension and control elongation. Third cable coiled on to eliminate dancing and shimmying . . . Has strength to match highest operating pressures—flexibility to drape smoothly on any type of rig.

TUBE: Neoprene-base synthetic compound meets all current operating requirements, including high mud temperatures, oil-based mud and oil emulsions.

COVER: Neoprene-base synthetic compound—resists oil, sun-checking, strain crack, cutting abrasion, weather and temperature extremes. Black with longitudinal yellow stripe to ease alignment.

SAFETY EYE: Permanently fused to hose body 29" from threaded end of coupling at each end of hose for attaching safety chain to derrick and swivel—eliminates need for external clamps.

The new Hewitt-Robins Cable-Reinforced Rotary Drilling Hose is now available at these distributors:

THE BETHLEHEM SUPPLY COMPANY OF CALIFORNIA
MID-CONTINENT SUPPLY COMPANY
NORVELL-WILDER SUPPLY COMPANY
STANDARD SUPPLY & HARDWARE COMPANY

HEWITT HR ROBINS

Executive Offices, Stamford, Connecticut

DOMESTIC DIVISIONS: Hewitt Rubber • Robins Conveyors • Robins Engineers • Restfoam

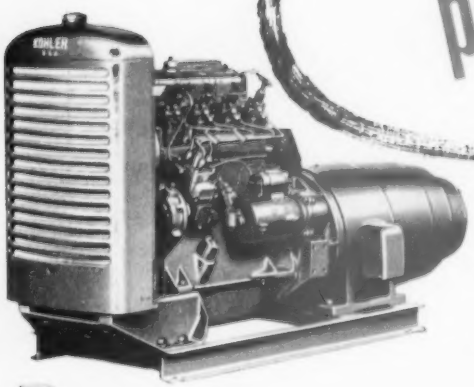
FOREIGN SUBSIDIARIES: Hewitt-Robins (Canada) Ltd., Montreal • Hewitt-Robins Internationale, Paris, France • Robins Conveyors (S. A.) Ltd., Johannesburg • EXPORT DEPARTMENT: New York City

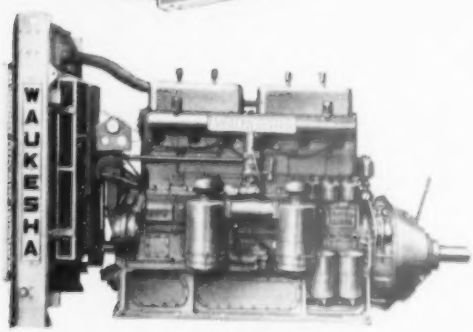
OUR ADDITION OF

KOHLER ELECTRICAL PLANTS AND ENGINES

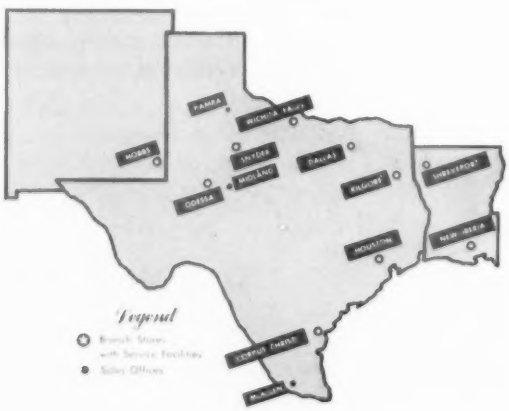
SUMS UP T . . .

complete power service





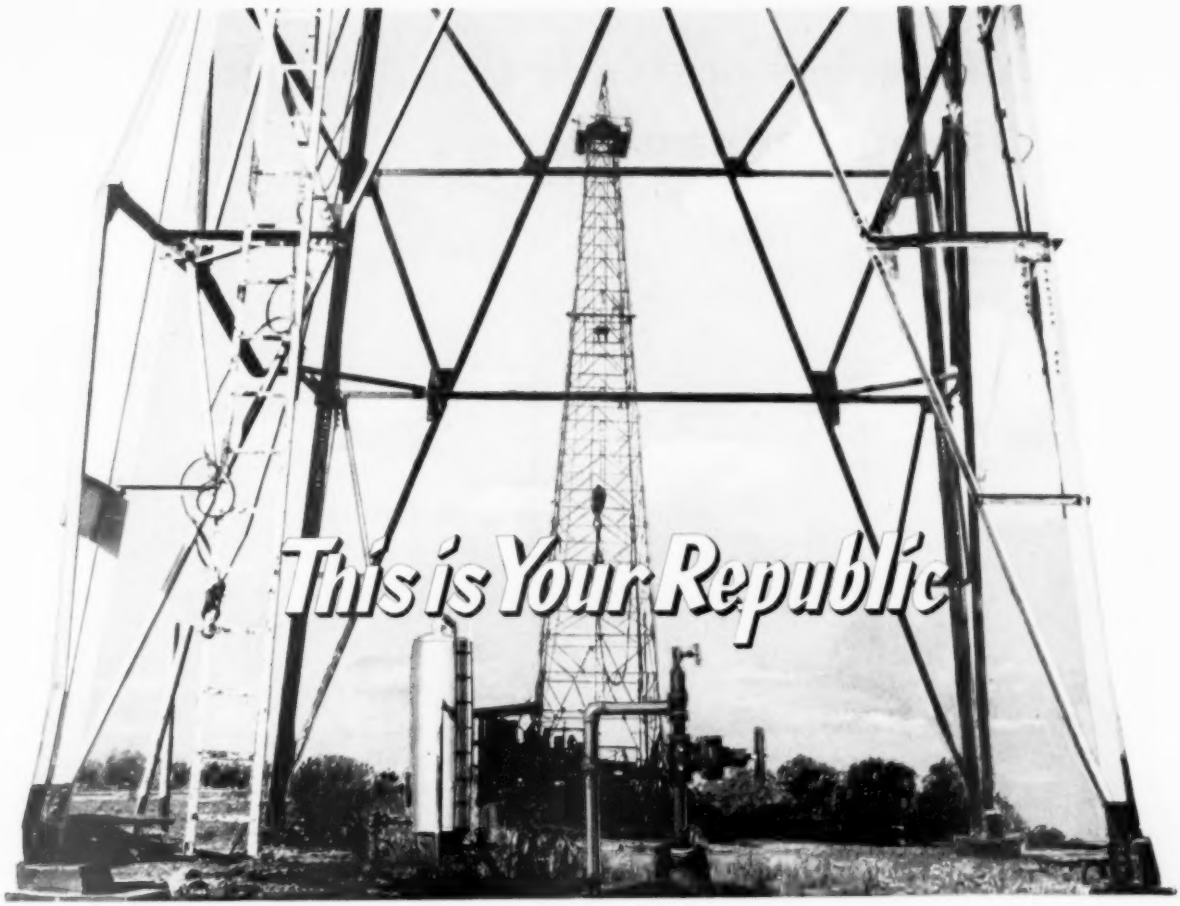
Now, your nearby Waukesha Sales and Service, Inc., Branch is equipped to give even more thorough service to your power problems. In addition to a complete line of Waukesha Engines and parts, famous Kohler Electrical Plants and Air Cooled Engines are now available at the Waukesha Sales and Service, Inc., Branch in your area. These dependable Kohler plants provide an independent source of electricity capable of performing hundreds of routine needs as well as a stand-by protection against power failure. Models range in size from 500 watts to 30 KW and are powered by 4-cycle gas, gasoline or diesel engines. The low cost of these compact units is often offset by losses prevented during a single power failure. And don't forget service! Our modern shops at locations shown below are staffed with experienced mechanics who uphold the Waukesha Sales and Service, Inc., reputation of unsurpassed 'round the clock service. Call or write today for further information on any Waukesha or Kohler products.

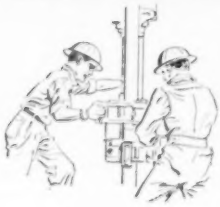


Waukesha

SALES & SERVICE, INC.

1422 MAURY ST. • HOUSTON, TEXAS





Oil powers its progress . . . your bank helps you produce it!

Oil lies buried under one . . . two . . . three miles of dirt and rock. Finding it — recovering it — is a job for men of courage and skill — oilmen — with the will to work and the right to profit.

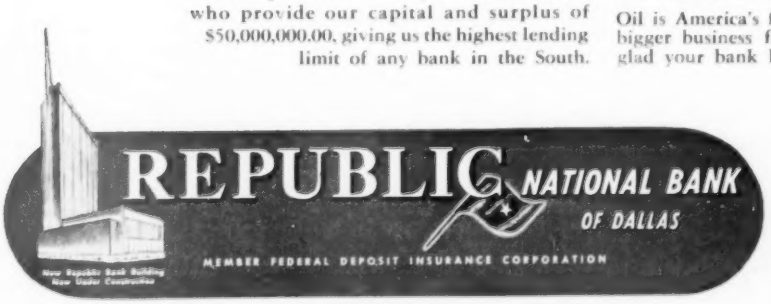
It is also a job for money. Lots of it. And hundreds of millions of dollars of it have come from our bank. It is supplied by our depositors — and by our stockholders who provide our capital and surplus of $50,000,000.00, giving us the highest lending limit of any bank in the South.

Years ago the Republic pioneered the first oil production loans by commercial banks. Since then our bank has made so many oil loans — in every oil-producing state in the nation — that oil men call us "The Oil Bank."

We like that name. It tells the story of Republic's leadership in working for this dynamic industry. It tells, too, of the many ways our bank works for *you* — for every oilman!

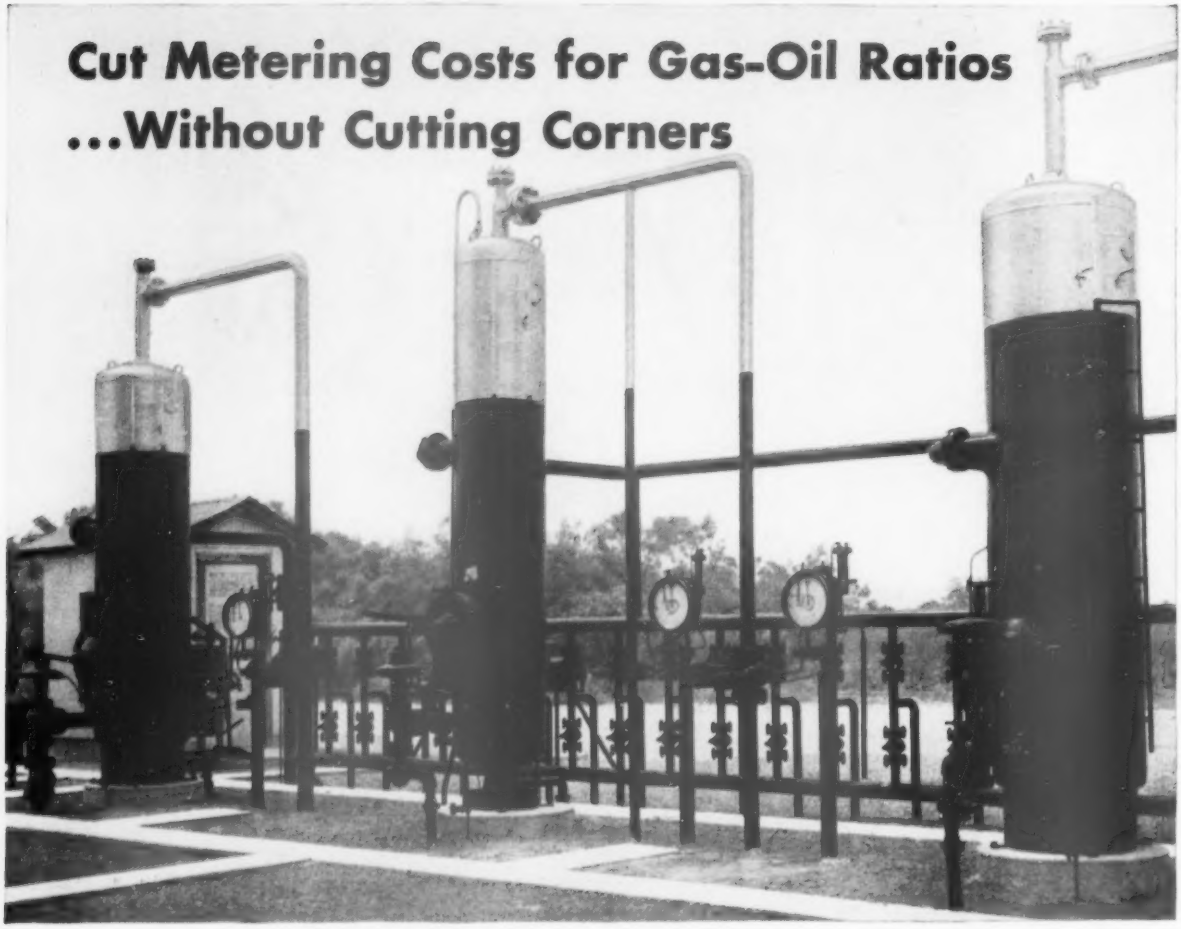
Oil is America's fortune. It means better living — bigger business for every American. We're glad your bank has a hand in it.

Fred B. Kearney
PRESIDENT



Capital and Surplus $50,000,000.00 — Largest in the South

Cut Metering Costs for Gas-Oil Ratios ...Without Cutting Corners



Measuring gas from Separator Batteries at Conoco Driscol Field, Benavides, Texas with 3 Foxboro Gas Flow Meters Type 4.

HERE'S THE WAY IT'S DONE

By taking advantage of the exclusive features built into Foxboro Flow Meters, you can cut meter inspection trips and recalibration to the bone . . . *and eliminate mercury losses completely.* You won't need to coddle these meters to get accurate records.

Foxboro Flow Meters are designed with a *unique straight-line linkage* that makes factory adjustments permanent. Their sustained accuracy is outstanding. Four to six years' service without recalibration isn't uncommon! In addition, floats of Foxboro Meters are *extra large* and have *extra long* travel. This means unequalled *power* . . . giving highest accuracy at the pen. *Sure-Seal Check Valves,* submerged in mercury, positively prevent mercury losses. And for freedom from friction and freeze-ups, Foxboro Pressur-Tite Bearings have never been equalled!

These are the reasons why experienced production men prefer Foxboro Flow Meters above all others . . . why you can cut metering costs without jeopardizing the accuracy of your records.

WRITE FOR Bulletin 460

for complete details.

The Foxboro Company, 607 Neponset Avenue, Foxboro, Mass., U.S.A.

FOXBORO REG. U. S. PAT. OFF.

MONEY-SAVING FLOW METERS

YOUNG *All the Way!*

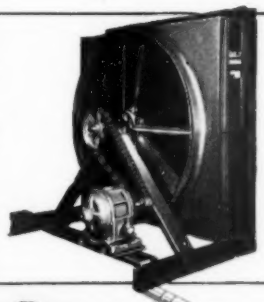
FROM WELL...

...TO GASOLINE PLANT

"MONO-WELD" Heavy-Duty Steel Radiator

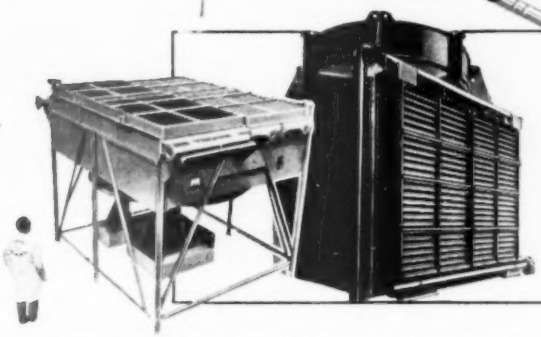
Fixed and Removable Tube and Bundle Heat Exchangers

"MONO-WELD" Radiators are available for cooling jacket water or for cooling jacket water and lube oil in a single unit. They are especially suitable for skid-mounted equipment and have welded steel tank and side member construction. Tube and bundle heat exchangers are particularly well adapted to applications where compactness is at a premium.



Heavy-Duty "FULL FLOW" and Standard Series Jacket Water Coolers

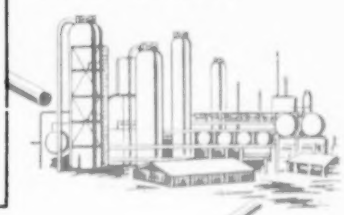
Remote locations require dependable, trouble-free cooling units, easy to maintain. Sturdily constructed "FULL FLOW" Jacket Water Coolers with removable sections (optional) make it possible to repair and replace easily. Accessories: motors, idlers, pumps, surge tanks, controls, shutters, etc.



Young "HC" (left) and "VAD" Vertical Air Discharge Cooling and Condensing Equipment

These large units can take care of your biggest cooling job. Versatility is a keynote —standard models provide for water, gas or oil cooling, steam or vapor condensing in any combination. Accessories available: motors, controls, shutters, gear boxes, etc.

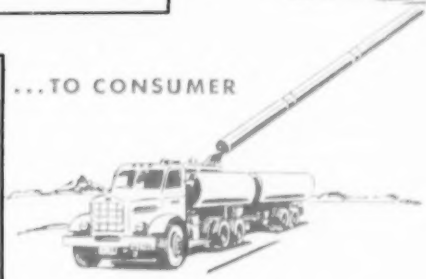
...TO REFINERY



Young Radiators For All Automotive Applications

Young serves every phase of the oil industry. Many manufacturers of oil transport and delivery equipment specify Young Radiators for gasoline and Diesel equipment. These radiators are carefully engineered for the specific job, as is the heat transfer equipment for the biggest oil field jobs.

...TO CONSUMER



YOUNG RADIATOR COMPANY

Dept. 2014 • RACINE, WISCONSIN
Factories at Racine, Wisconsin and Mattoon, Illinois

YOUNG

Heat Transfer Products for Automotive, Agricultural, Industrial, Gas and Diesel Engine Applications

Heating, Cooling, Air Conditioning Products for Home and Industry

Leaders in Heat Transfer Engineering for more than 25 years

OIL FIELD REPRESENTATIVES:

J. R. MEEK COMPANY, 1341 S. Boston St., Rm. 109, Tulsa.
FLOURNOY & EVERETT, INC., 5043 Santa Fe Ave., Los Angeles
HAROLD J. YOUNG, 206 Montgomery Bldg., Muskegon.
JONES & LAUGHLIN STEEL CORP., Supply Div., 106 Main St. Bradford, Penn.; Union Commerce Bldg., Cleveland; 401 Liberty St., Gateway Center, Pittsburgh; Clarksburg, West Virginia.

Other Representatives In Principal Cities

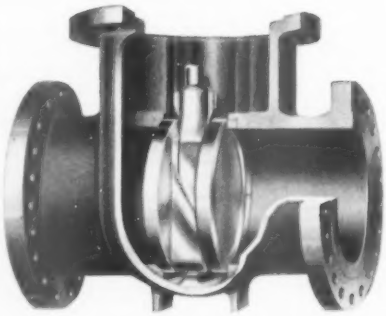
10" Darling fully revolving double disc parallel seat gate valves on a surface condenser in a natural gasoline plant.

How they save dollars in natural gasoline service with DARLING Revolving Disc GATE VALVES

TIGHT CLOSURE EVERY TIME!...That's one big advantage of Darling revolving disc gate valves on this surface condenser. The fully revolving double disc parallel seat feature of these Darling valves automatically compensates for valve body distortion, *assuring tight closure* and *uniform* distribution of disc and seat wear too . . . even under severe pressure and temperature changes.

JUST FOUR SIMPLE WORKING PARTS. . . . Two interchangeable, no-pocket discs and two husky wedges are all the operating parts in Darling *fully revolving double disc* parallel seat gate valves. No links or other devices are needed to hold the discs and wedges together. Any part can be quickly and inexpensively replaced without removing the valve from the line.

WIDE RANGE OF SIZES. Darling revolving disc parallel seat gate valves come in types and sizes for main line, gathering, manifold, tank farm and other gas and oil line services. Just outline your specific service requirements or write for descriptive literature today!



Cutaway showing complete simplicity of the Darling fully revolving double disc parallel seat principle.

DARLING VALVE & MANUFACTURING CO.
Williamsport 1, Pa.

Manufactured in Canada by Sandilands Valve Manufacturing Co., Ltd., Galt 19, Ontario

BENDS LIKE THIS

CAN CUT YOUR TUBING COSTS

It takes uniformly ductile tubing . . . easily workable . . . to make these hairpin bends. Uniform wall thickness is important, too. And so are uniform diameter, uniform concentricity and uniform strength.

You'll find all these features . . . and more . . . in Republic ELECTRUNITE Pressure Tubing. ELECTRUNITE Tubing has no hidden defects. It's made from flat-rolled steel that's inspected on both sides *before* the tubing is formed. Result: tubing that's free from scale, scabs and slivers . . . has a fine surface that helps resist corrosion . . . has no longitudinal thin spots.

Whether you're interested in re-tubing . . . or new equipment . . . it will pay you to specify ELECTRUNITE Pressure Tubes. Available in both carbon and various stainless analyses. Write for booklet CEC-53 for complete information.

PRODUCED TO ASTM SPECIFICATIONS

CARBON

A-178
A-214

STAINLESS

A-249
A-269
A-312

STEEL AND TUBES DIVISION
REPUBLIC STEEL CORPORATION
219 EAST 131st STREET • CLEVELAND 8, OHIO

REPUBLIC STEEL

Republic
ELECTRUNITE
BOILER, CONDENSER AND HEAT EXCHANGER TUBES

ELECTRUNITE—THE ORIGINAL ELECTRIC WELDED BOILER TUBE

AMERICAN ELECTRONIC PROCESS CONTROL SYSTEM

improves QUALITY of CONTROL

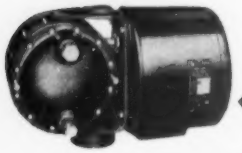
reduces CAPITAL INVESTMENT

Every advantage and superiority of electric transmission of measurement and operational signals is utilized in the new, complete American Electronic Process Control System. Quality of control of temperature, pressure, differential pressure, liquid level and flow is improved. Capital investment for a given through-put is reduced. Ideally suited for integration into automatic logging systems. Every requirement for accuracy, dependability, flexibility, low maintenance and convenient servicing is fully satisfied because this new electronic system provides:

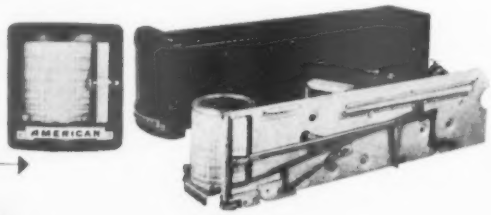
1. Practically lag-free signal transmission.
2. High stability that permits use of narrower proportional bands.
3. Control sensitivity virtually impossible to duplicate in other types of actuation.
4. Freedom from dirt, corrosion, leakage and freeze-ups.
5. Standardized control components interchangeable at the panel.
6. Control-house installed controllers, *any* distance from the process area.
7. Easy-to-service plug-in components in each instrument.
8. Adaptability—more than one input circuit can be fed into a controller for cascading purposes, without adding a relay.
9. Flexibility—output signal can be fed in series to any number of receivers, without impairing accuracy.
10. Transducers for tie-in with pneumatic systems.
11. Minimum capital or maintenance investment in air compressors, filters, pressure regulators or dryers.
12. Integration with analog and digital computational and print-out equipment.
13. Multipoint-potentiometer type recording of all process variables.

Major instruments in the American Electronic Process Control System are pictured here. Get complete data. Learn how this new system can *improve quality of control and reduce the size and cost of your process equipment for a given through-put.*

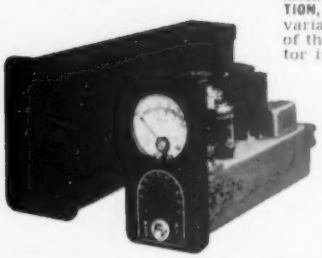
Write for Catalog No. 164.



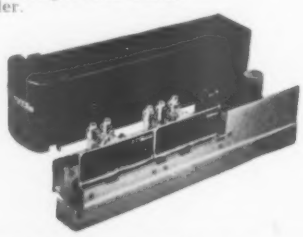
AMERICAN ELECTRONIC TRANSMITTERS. Transmit measurements of temperature, pressure, differential pressure, liquid level and flow. Pictured is differential pressure transmitter with Barton cell.



AMERICAN ELECTRONIC RECORDING CONTROL STATION, TYPE 162. Records the value of process variables and determines the control points of the controller. Type 161 provides indicator instead of recorder.



AMERICAN ELECTRONIC MANUAL POSITIONER, TYPE 153MP. For remote loading of the Electro-Pneumatic Valve Positioner or an Electro-Pneumatic Transducer. Designed for use with Type 163 Controller.



AMERICAN ELECTRONIC CONTROLLER, TYPE 163. Automatically controls the manipulation of a process variable by means of the Electro-Pneumatic Valve Positioner or an Electro-Pneumatic Transducer.

AMERICAN ELECTRO-PNEUMATIC VALVE POSITIONER, TYPE 132C. Provides precise positioning of all standard pneumatically-powered valves by an electric signal. Useable with either air-to-open or air-to-close valves.

AUTOMATIC LOGGING — continual tabulation of process values in digital form by an electric print-out device — is becoming of increasing importance to the economical operation of the process industries. The output of the instruments in the American Electronic Process Control System (0.5 to 5.0 milliamperes) is ideally suited to the input requirements of available automatic logging equipment.

AMERICAN INDUSTRIAL INSTRUMENTS

A product of **MANNING, MAXWELL & MOORE, INC.** STRATFORD, CONNECTICUT

MAKERS OF 'AMERICAN' INDUSTRIAL INSTRUMENTS, 'HANCOCK' VALVES, 'ASHCROFT' GAUGES, 'CONSOLIDATED' SAFETY AND RELIEF VALVES, AIRCRAFT PRODUCTS. BUILDERS OF "SHAW-BOX" AND 'LOAD LIFTER' CRANES, 'BUDGIT' AND 'LOAD LIFTER' HOISTS AND OTHER LIFTING SPECIALTIES.

BEAIRD-INGERSOLL-RAND

Packaged Compressor Plant

Lowest Cost Per Horsepower Installed

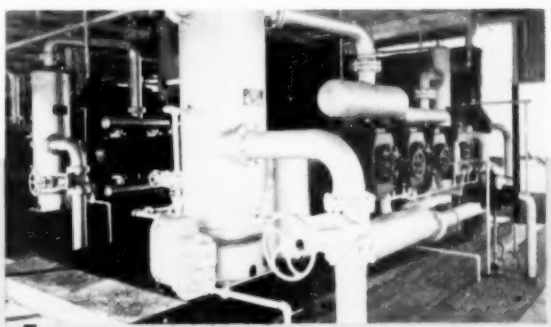
MAGNOLIA PETROLEUM COMPANY uses gas lift to produce oil wells in Baldwin Field, Texas. As gas demand for lift operations varies considerably, it is necessary to provide an ample supply of gas and yet maintain a constant pressure at the well head. To do this, Magnolia has installed a bank of four Beaird-Ingersoll-Rand packaged compressor plants. These units, equipped with 4-cycle engines and automatic speed and pressure regulators, vary their speed automatically from 50% to 100% to maintain a uniform gas pressure without the necessity of popping off or flaring.

The four units were assembled at the factory and transported directly to location as complete units. Speed and pressure controls are integral parts of the packaged plants.

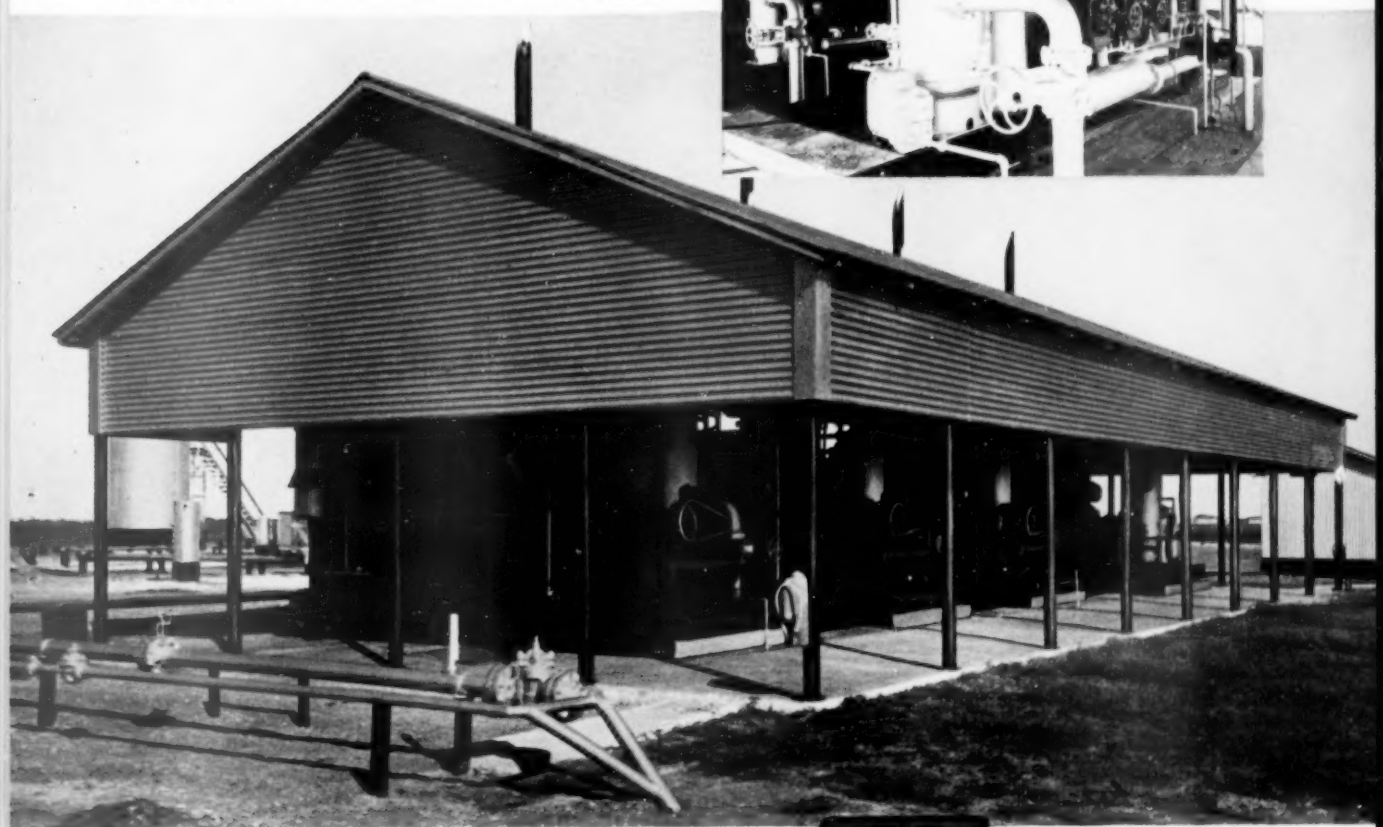
Let us tell you about the economy of using Beaird-Ingersoll-Rand packaged compressor plants—singly or in multiple unit installations.

Meets varying gas demand —

HOW CONSTANT GAS PRESSURE IS ASSURED IN A GAS LIFT OPERATION



These four Beaird-Ingersoll-Rand packaged compressor plants have a total of 715 horsepower. Each unit is complete with Ingersoll-Rand gas engine-driven compressor, Young Radiator and all components usually found in permanent compressor stations. Other sizes from 110 h.p. to 550 h.p. per unit.



PACKAGED COMPRESSOR PLANTS

CAST STEEL FITTINGS

PRESSURE BULK STORAGE

ANHYDROUS AMMONIA EQUIPMENT

LP GAS SYSTEMS

BEAIRD

MACHINING
FABRICATING
STEEL WAREHOUSE

THE J. B. BEAIRD COMPANY, INC.

Shreveport, Louisiana

BEAIRD *Cast Steel Fittings*

Fittings that fit

Why Beaird Fittings Fit

You admire the sheer good looks of a piping installation as much as you appreciate its ability to withstand years of heavy use. And you know what a difference it makes in operation when the fittings are properly trued-up, all down the line. That's why Beaird has devoted a lot of attention, in the twenty-seven years it has made them, to producing fittings of exceptional trueness. That's why the companies who use them agree that *Beaird fittings fit.*

FLANGES FULLY BACK-FACED — provides smooth seat for stud bolt nuts — allows uniform stressing of bolts.

BOLT HOLE CIRCLES AND FLANGE CIRCUMFERENCES CONCENTRIC WITH BORE — assures true alignment of bore when flanges and bolt holes are lined up — speeds installation.

GASKET FACES MACHINED WITH FINE PHONOGRAPHIC FINISH – grips gaskets firmly — prevents leaks — reduces gasket replacement.

Ask your supply house for the new catalog of Beaird cast steel fittings — or write to us direct.

THE J. B. BEAIRD COMPANY, INC. SHREVEPORT, LOUISIANA

BEAIRD

MACHINING FABRICATING STEEL WAREHOUSE

PACKAGED COMPRESSOR PLANTS

CAST STEEL FITTINGS

PRESSURE BULK STORAGE

ANHYDROUS AMMONIA EQUIPMENT

L P GAS SYSTEMS

They Say—

Shelf Control Problem

"Sen. Price Daniel has asked the really pertinent question in the admittedly new issue that is raised respecting the outer shelf. Just what machinery will the federal Government set up for administration of any new territory that is within the boundaries of the United States but not within the boundary of any given state? . . . Let the administrative systems of adjacent states prevail over the outer shelf. Some formula can be worked out for a division of revenues that may be derived from the newly annexed area."

Editorial in the Dallas Morning News.

Congress Should Keep Shelf

"Now that the coastal states have obtained what they were immediately after, i.e., the oil in waters adjacent to their shores, it is imperative that Congress take positive steps to develop the rest of the undersea wealth in the interests of the nation as a whole. Having made a very sizable (and in our opinion most unwise) gift of mineral resources to a handful of states, Congress is under the clear obligation to make sure that the remaining five-sixths of the offshore oil reserves are exploited under federal controls and with royalties accruing exclusively to the federal Government."

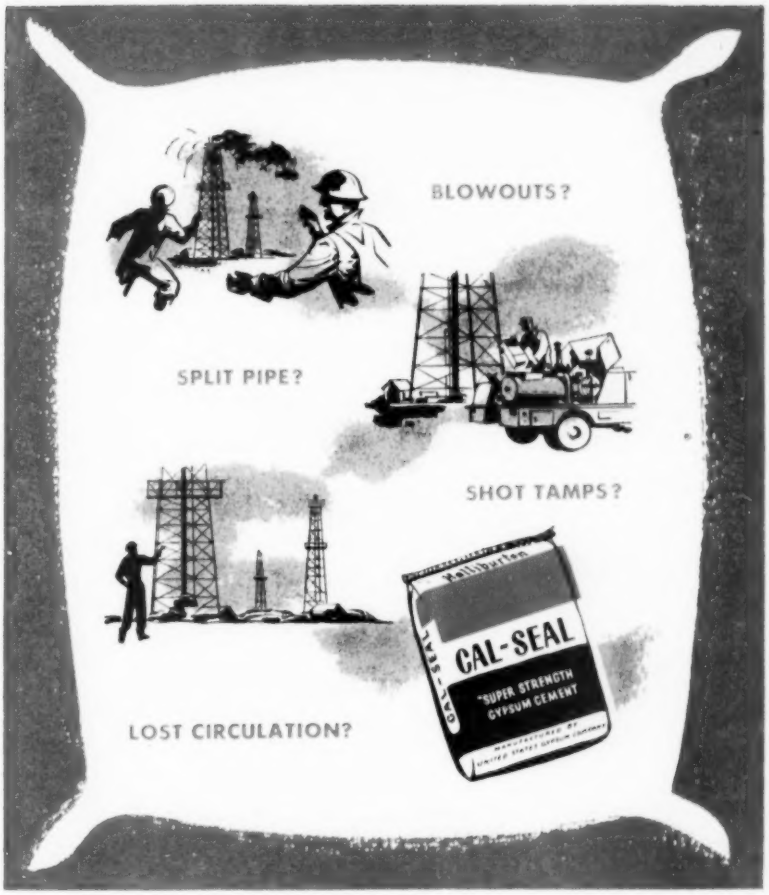
Editorial in the New York Times.

More Expansion Needed

"The petroleum industry, has, for my money, done a good job of expanding its productive facilities over the 2½ years since defense mobilization began . . . We are far better prepared for oiling a war today than we were even a year ago.

"But while substantial progress has been made in petroleum preparedness, we cannot say that we have enough capacity. Even more would be welcome as security insurance.

"Anyone who takes a long-range look at petroleum supply has to realize that you can't just go out next week and open up a new supply if the demand for it suddenly arises. It takes years to find geological prospects, to complete leasing arrangements, to drill exploratory wells, and to develop the oil fields. Today's petroleum supply is the product of yesterday's efforts, and tomor-



SLASH DOWNTIME
EVERY TIME . . . CALL FOR
CAL-SEAL!

That's the way to get *dependable* results every time. Call for CAL-SEAL—the U.S.G. super-strength gypsum cement. CALL HOWCO for quick action. A fast-working HOWCO crew will put the latest oil well cementing equipment to work for you. They're trained to bring you *all* the benefits of CAL-SEAL—speed, expandability, controlled setting time, compressive strength. Call HOWCO for CAL-SEAL!

Halliburton Oil Well Cementing Company
DUNCAN, OKLAHOMA
"CAL-SEAL is a trade mark reg. U.S. Pat. Off. for a super-strength gypsum cement manufactured by U. S. Gypsum Co.

MISSION
SUPER-SERVICE LINERS WITH SATIN FINISH* SAVE YOU TIME AND MONEY BECAUSE THEY OUTPERFORM AND...
outlast all ordinary Liners
*Trade Mark Registered U. S. Patent Office.

Why Super-Service liners were dressed up in a Satin Finish

With the continuous increase in mud pump pressures, it became evident to Mission engineers several years ago that an improved type liner could save the industry thousands of dollars a year. Too many piston failures could be traced directly to the liner as the main cause of failure.

So Mission set out to eliminate these causes of liner failure . . . and to produce a better liner IN A COMPETITIVE PRICE RANGE to match the long-life quality of Mission Pistons, Valves and Rods.

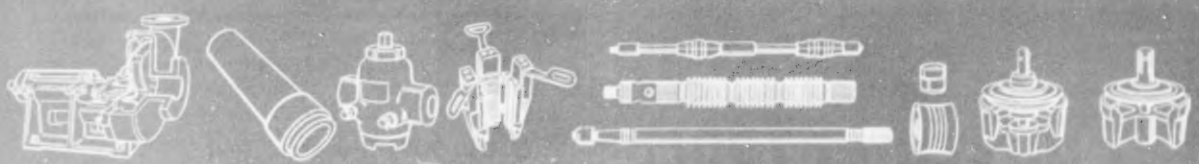
First, Mission selected forgings of special alloy steel for careful heat treatment to secure a deep, file-hard case. Precision machining and rigid inspections followed.

Then, Mission did what no other liner manufacturer has ever done . . . before or since. To liner bores that were accurately honed to extreme smoothness, Mission applied the exclusive Satin Finish process* WHICH PRODUCES A FINER, MORE ULTRA SMOOTH FINISH THAN CAN BE SECURED BY REGULAR HONING OR GRINDING.

That's why Mission Super Service Liners with Satin Finish* have proved beyond question to insure longer life for liners and pistons. Available through supply stores.

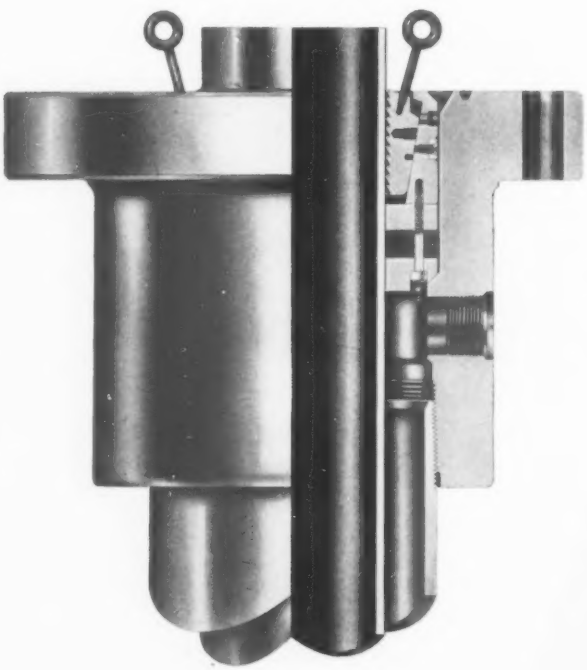
MISSION
MANUFACTURING CO.

P. O. BOX 4209 • HOUSTON, TEXAS
Export Office: 30 Rockefeller Plaza, New York



introducing the new champ in the medium duty field

Ever since O-C-T pioneered the first deep well casing head that provided casing seal and suspension before blowout preventers were removed, we have recognized the need for this same safe, simplified type installation for a medium priced — medium duty casing head. Now, O-C-T research and study of casing head flexibility and safety have resulted in the introduction of this new O-C-T "C-20" Casing Head for medium depth wells. Check the features, advantages, and safety this new O-C-T head brings to the field . . . then write for the C-20 Brochure containing Engineering Nomograph for Calibrating Casing Loads and Pressures . . . Or ask your O-C-T Representative for details. Available through more than 700 supply store locations.



O-C-T C-20 CASING HEADS

THE FIRST AND ONLY QUICK-SETTING, POSITIVE-SEALING WELL HEADS DESIGNED ESPECIALLY TO ELIMINATE OPEN HOLE HAZARDS IN MEDIUM DEPTH WELLS.

1. Seals and suspends casing before blowout preventers are removed.
2. Saves hours of costly rig time — simplifies installation.
3. Sealing element, slip bowl and slips are assembled at the O-C-T plant as a single unit that may be wrapped quickly around the casing, latched and dropped into place from the derrick floor.
4. It employs a resilient seal ring which provides an effective seal for the life of the well in any climate.

Oil Center Tool Co. P. O. Box 3091 Houston, Texas

Export Representatives: Sterling Areas — Le Grand, Sutcliff & Gell, Ltd., Rochester, Kent, England. Address Export Inquiries for All Other Countries to P. O. Box 3091, Houston 1, Texas

row's depends on what is done today. Any reserve for emergency we are to have in the future must be developed now and continuously maintained."

J. Ed Warren, former deputy administrator, Petroleum Administration for Defense, in an address before the eastern district, American Petroleum Institute Division of Production, Pittsburgh.

Canadian Gas Higher

"Canadian natural gas lines cannot bring cheaper gas because their prices are based on unrealistic rates of return. When the pipe line is constructed, it will be found that the Canadian line must seek a higher rate. Then the regulatory bodies will allow the rate to be jacked up to a more practical rate of return. At accepted rates of return the gas would then cost Seattle and Portland 50 cents per thousand cubic feet.

"Pacific Northwest Pipeline already has a realistic rate of return figured, and it can sell gas to us for less than 35 cents per thousand feet.

"Even figured as the estimates are now, the Canadian proposal would result in prices as much as 8 cents higher to Spokane and a few small inland towns that would get Canadian gas. If this differential was spread out over the entire line, Canadian gas would be higher than American gas to the coast."

Henry Gellert, president of Seattle Gas Co., addressing the annual convention of Oregon Bankers Association, Eugene, Ore.

Offshore Exploration Increases

"Even the short time since the signing by President Eisenhower of the submerged lands act on May 22 has brought a flurry of interest in oil exploration, not only off the shores of Louisiana, California, and Texas, but also off the shores of other of the 15 states bordering the coasts. These states, which with the exception of Florida, has shown little interest in oil exploration in their offshore lands, are awakening to the possibilities of wealth within their seaward boundaries."

Editorial in the Fort Worth Star-Telegram.

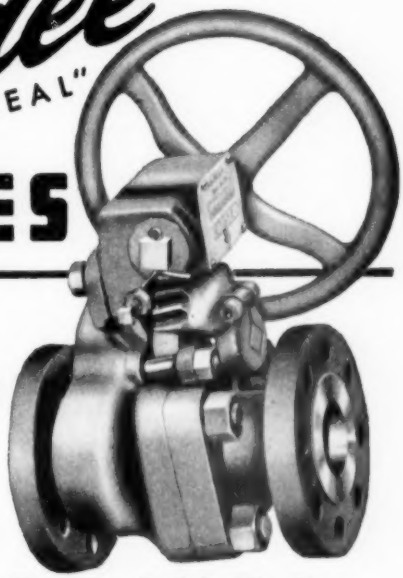
Information Program Needed

"Give the public information in order that it may better understand the natural gas business.

"Generally speaking, the public thinks of the natural-gas industry as a public utility. It places it in the same general category with the manufactured gas utility, the electric utility, the water utility or the telephone utility, from which it gets a bill once a month for

APPROVED

Okadee "PERFECT SEAL" VALVES



for Bubble-tight Primary Shut-off in L P GAS LINES

Underwriters' Laboratories, major LP gas producers*, and Liquified Petroleum Gas Commissions of several States* approve Okadee Valves for primary shut-off in LP gas lines. In addition, Okadee Valves are used in virtually all types of gas and liquid lines at pressures to 600 p.s.i. and temperatures to 800°F.—wherever a perfect seal, low maintenance and long life are necessary.

Get complete data, including material specifications, on Okadee Valves — and newest Underwriters' Laboratories test report—without obligation, today.

**Names on request.*

- A. S. A. Standard dimensions
- Sizes from ½" to 6"
- Single- and double-seated disc valves
- Hard-faced valves and seats . . . perfect metal-to-metal seal
- Self-cleaning, self-compensating valve discs
- Lever, rack-and-lever, or worm-gear operation
- Non-lubricated
- No wedge action
- Valves and seats wear in instead of "wearing out"
- All parts quickly replaceable in the field
- Inside and outside stem packing . . . double assurance against stem leaks

Underwriters' Laboratories Reexamination Service Guide No. 141 A3.1.22, File MH5163. SL Screwed Type Series and Series 15 and 30 Flanged Type Okadee Valves are suitable as a positive shut-off in LP gas pipelines and other LP gas applications for a working pressure of 250 p.s.i.

Write for Bulletin No. 51FL

OKa. Okadee COMPANY
332 South Michigan Avenue • Chicago 4, Illinois

HENRY H. PARIS DISTRIBUTOR Inc.
Manufacturer's Agent - Oil Well and Refinery Supplies
P. O. BOX 932 HOUSTON, 1125 ROTHWELL ST. TEXAS

Agent and Distributor for the following Nationally Known Manufacturers:

ALTEN FOUNDRY & MACHINE WORKS
Lancaster, Ohio
Pumping Units, Jacks & Surface Equipment.

DRESSER MANUFACTURING DIV.
Bradford, Pa.
Seamless Welding Fittings.

GLOBE MACHINE & NIPPLE CO.
Houston, Texas
Arrow Brand Pipe Nipples—All Kinds.

THE GORMAN-RUPP COMPANY
Mansfield, Ohio
Centrifugal Pumps.

HARRISBURG STEEL CORPORATION
Harrisburg, Pennsylvania
Forged Steel Flanges and Seamless Casing Couplings.

LOS ANGELES BOILER WORKS
Los Angeles, California
Welding Caps—Dished & Flanged Heads.

MILLS IRON WORKS, INC.
Los Angeles, California
Seamless Swage Nipples, Bull Plugs & Welding Reducers.

MUD PRODUCTS, INC.
Tulsa, Oklahoma
Mud-"O"-Ring Butterfly Valves.

THE OHIO INJECTOR COMPANY
Wadsworth, Ohio
OIC Valves, Bronze, Iron, Cast and Forged Steel for all purposes.

OIL STATES EQUIPMENT COMPANY
Houston, Texas
OSECO Silvertop Fusible Plugs with renewable inserts for all types OIL COUNTRY BOILERS.

STEEL FORGINGS, INC.
Shreveport, La.
Weld Saddles.

VOLCANO BURNER COMPANY
Houston, Texas
Volcano Superior and Gulf States All Steel Gas Burners for OIL COUNTRY BOILERS.

WESTERN SAFETY BARREL STAND
Houston, Texas
Stand lifts, holds, tilts 55 gal. barrels. Prevents spillage—easily loaded.

WHEELING MACHINE PRODUCTS CO.
Wheeling, West Virginia
XL Steel Pipe Couplings for OIL COUNTRY TUBULAR PRODUCTS.

utility service. It has very little idea of the peculiar characteristics of the natural-gas industry. The tragedy of it is that in many instances the same regulatory agencies which pass on the affairs of all these different utilities do not understand how different the natural-gas industry is.

"Let the public understand . . . some of the hazards of the producing business, and let it see how it is different from a public utility. Let it understand the highly competitive aspects of the business. Let it realize the importance of continuing to find new reserves and I believe it will agree with us."

C. P. Rather, president of the Independent Natural Gas Association of America and Southern Natural Gas Co., addressing the annual meeting of Texas Independent Producers and Royalty Owners Association, Austin.

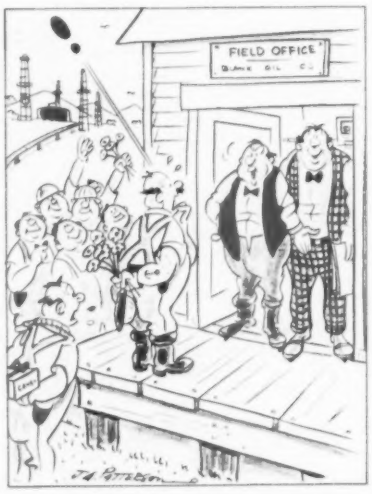
Politics Cannot Run Business

"Politics is not adapted to run a business. Business is conducted in the United States under the competitive system, with a higher degree of fairness, equality, and justice to those who are in it, and with more appreciation of the responsibility to serve the public, than any similar Government enterprise. Private industry is two jumps ahead of the requirements of the people, while most government operations limp laps behind.

"When you take the individual incentive out of any job and pass it on to the desks of public office holders, it becomes a routine, lifeless, and costly activity.

"Individual reward for individual merit has made this country what it is today."

W. Alton Jones, president of Cities



"So you boys want to meet Frances, my new stenographer—Okay, boys, this is Francis."

IF YOU'RE LOOKING FOR A GOOD MANUFACTURING SOURCE FOR YOUR OIL FIELD RUBBER PRODUCTS LOOK TO GUIBERSON!

Whatever you need in oil field rubber products, whether synthetic or natural, Guiberson will manufacture them to your specifications. Guiberson brings to your rubber problems its years of experience in the oil industry... a staff of skilled production men... and a huge, fully equipped rubber plant and laboratory. It has the equipment, the knowledge and the ability to produce precision rubber products unexcelled in the oil industry.

GUIBERSON SPECIALIZES IN HIGH-QUALITY PRESSURE MOLDED RUBBER PRODUCTS PRODUCED TO ACCURATE SIZE AND UNIFORMITY

THROUGH
controlled compounding... accurate molding... unusual ability to bond rubber, metal and textiles

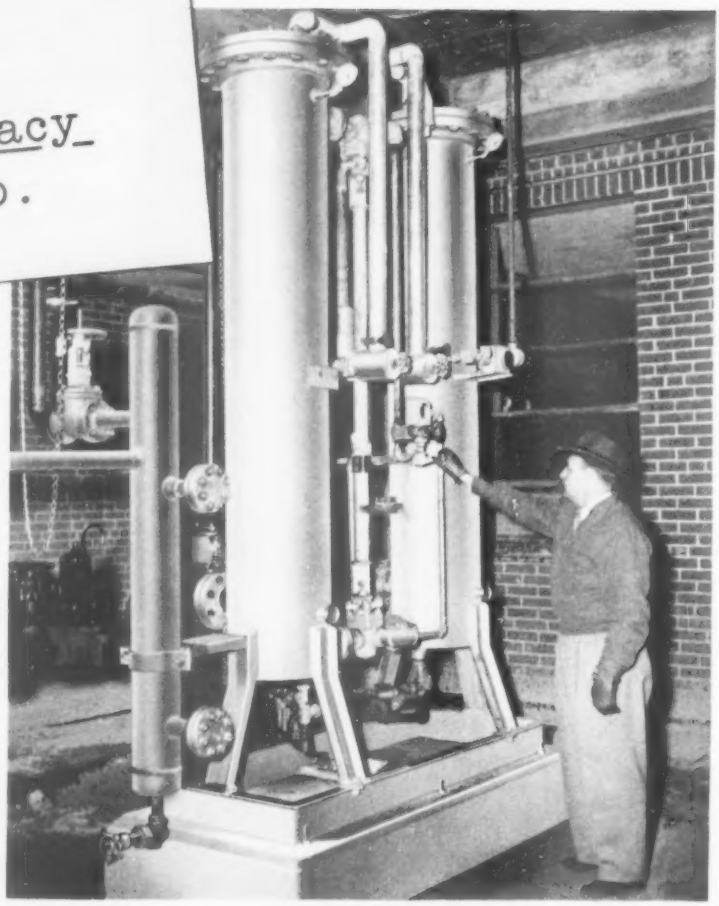
GUIBERSON GIVES YOU RUBBER PRODUCTS THAT
wear like iron... resist oil and gas... stand up to high pressures and temperatures.

If You Have a Rubber Problem...
Let Guiberson
Quote on Your Requirements

THE
GUIBERSON
CORPORATION
ESTABLISHED 1919 • DALLAS, TEXAS, U. S. A.
Over 34 Years Experience Serving the Oil Industry

Case No. 64

Kemp Dryer
Assures Accuracy
For Sun Oil Co.



How SUNOCO® guarantees dependable instrument readings 24 hours a day

WHEN the Sunoco Plant at Marcus Hook, Pa., introduced a new process at the beginning of the year, many new instruments were installed. To dry the compressed air operating these instruments and assure accurate readings, Sunoco installed a Kemp Model 300 S Dryer

Kemp Dryer Entirely Satisfactory

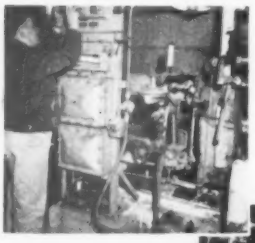
According to Harold Powers, Instrument Supervisor at Sunoco, the Kemp Dryer has been entirely satisfactory in performance. Operating continuously day and night since installation, it has performed according to specifications, has never been saturated, and has required very little attention.

Kemp Dryers for Every Purpose

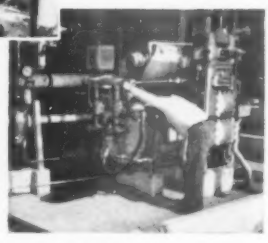
Kemp offers a variety of dryer models to meet all problems. Designed to dry air to sub-zero dew points at low cost, they are constructed of quality materials and embody the engineering knowledge gained from Kemp's many years of experience. They are available with manual, semi-automatic, or fully automatic tower reactivation. In addition, Kemp will prescribe the proper desiccant for each specific drying job. If you have a problem involving the removal of water from air, gases, or liquids, contact Kemp engineers now.

KEMP INERT GAS GENERATORS, too, serve Sunoco well

Sunoco reports that its two Kemp Inert Gas Generators have given highly satisfactory service. They are easy to start, and then operate automatically, requiring little attention. Both deliver high volume of gas of the proper analysis regardless of demand.



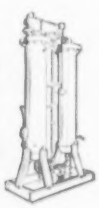
Kemp Inert Gas Generator Model C-5 MIHE. Delivers N_2 and CO_2 used to blanket top of wax tank.



Kemp Inert Gas Generator Model 8 MIHE. Produces N_2 and CO_2 for blanketing and for bubbler systems. Located in the open.

For more complete facts and technical information, write for Bulletin D-27 to:
THE C. M. KEMP MFG. CO., 405 East Oliver Street, Baltimore 2, Md.

KEMP OF BALTIMORE



DYNAMIC DRYERS

CARBURETORS • BURNERS • FIRE CHECKS
METAL MELTING UNITS • INERT GAS GENERATORS
SINGEING EQUIPMENT

Service Co., in an article appearing in the company's publication Service.

More University Research Needed

"At the present time the oil industry is helping basic research not only through the American Petroleum Institute but also through company programs of financial assistance to the universities. Several years ago some 300 companies were providing 1,800 fellowships, scholarships, or grants for research, and the number is much larger today.

"With most government research controlled by the Department of Defense, which seems not to understand the great need for basic work, industry has an increased responsibility. As has been pointed out so often, we can no longer depend on the fundamental research done in Europe."

Robert E. Wilson, board chairman of Standard Oil Co. (Ind.), in an address commemorating the 100th anniversary of the first scientific examination of crude oil at Dartmouth College, Hanover, N. H.

CALENDAR

JULY

July 30-
Aug. 1 Wyoming Geological Association, eighth annual field conference, University of Wyoming, Laramie.

AUGUST

17-19 Society of Automotive Engineers, international West Coast meeting, Georgia Hotel, Vancouver, B. C., Canada.

18-21 American Institute of Electrical Engineers, Vancouver Hotel, Vancouver, B. C.

24-26 Appalachian Gas Measurement Short Course, West Virginia University, Morgantown, W. Va.

Aug. 31-
Sept. 1 Interstate Oil Compact Commission, Northern Hotel, Billings, Mont.

SEPTEMBER

6-11 American Chemical Society, national meeting, Conrad Hilton Hotel, Chicago.

9-11 Pacific Coast Gas Association, San Francisco.

11-12 Association of Desk and Derrick Clubs of North America, annual meeting, Cosmopolitan Hotel, Denver.

13-16 American Institute of Chemical Engineers, Fairmont and Mark Hopkins hotels, San Francisco.

15-16 American Petroleum Institute, executive committee, Greenbrier Hotel, White Sulphur Springs, W. Va.

16-18 National Petroleum Association, annual meeting, Hotel Traymore, Atlantic City, N. J.

21-25 Instrument Society of America, national instrument conference and exhibit, Sherman and Morrison hotels, Chicago.

24-25 Western Petroleum Refiners Association, regional meeting, Henning Hotel, Casper, Wyo.

WECO ... the UNIONS you can trust for Sealing and Service

Selected Raw Materials

Advanced Manufacturing Practices

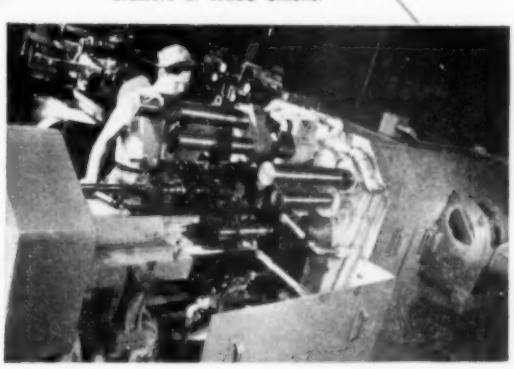
Ball and Cone Seat

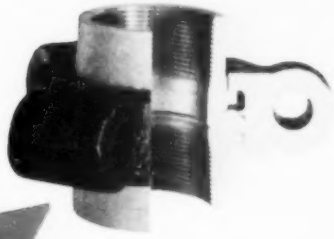
Rugged Acme Threads

Heavier Wall Sections

Precision Seating Surfaces

• One of several Six-Spindle automatic machines specially tooled for the manufacture of WECO Unions.





WECO FIG. 100 UNION

Advanced Manufacturing Practices

• At WECO, the manufacture of wing unions for the oil industry has become a highly specialized and precision process.

To maintain the long-lasting high standard of service . . . the unvarying uniformity and unmatched quality of WECO Unions has required specially built machines and specialized practices which are exclusive with WECO.

The use of automatic machines, many of which have been specially designed or modified for our operations, assures high-speed, high-quality production of WECO Unions. WECO, the most complete line of wing unions in the world, assures the utmost in dependability for sealing and service wherever a wing union is required.

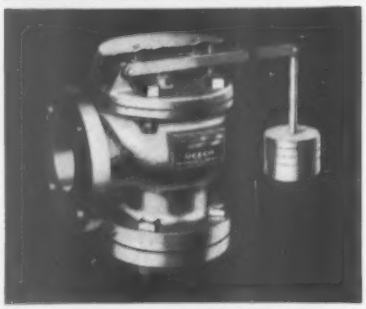
PESA

It's Wise to Standardize with... WECO ...

WELL EQUIPMENT MFG. CORP.
Division of Chiksan Company
HOUSTON 1, TEXAS
CHIKSAN COMPANY
Brea, Calif. Chicago 28, Ill. Newark 2, N. J.
CHIKSAN EXPORT COMPANY, Brea, Calif. Newark 2, N. J.

Manufacturers and Distributors of Oilfield, Refining, Marine and Industrial Equipment

OCECO
vacuum and *pressure* RELIEF VENTS



● Ideally suited for a wide variety of vacuum and pressure relief requirements. Cast steel housings. Bronze or stainless steel trim. 3″ x 3″; 4″ x 4″; and 6″ x 6″ sizes. Standard A.S.A. flanges. Vacuum setting, 1½ oz. to 1 lbs. per square inch. Pressure relief valves provided with a lever and weight for settings from 2 lbs. to 30 lbs. per square inch as desired. Write for fully descriptive data sheet.

OCECO TANK FITTINGS

THE JOHNSTON & JENNINGS CO.

division of PETTIBONE MULLIKEN CORP.

4751 West Division St. • Chicago 51, Illinois

MJCO® **SNAKE BITE KIT**

when the snake strikes...you have 10 minutes!

...this requires dependable, controlled suction to prevent the poison from spreading. In the New Improved Saunders* Kit, all components are packed for quick, easy use. Only the Saunders* pump carries a performance *guarantee*. Easy to operate by the victim alone if necessary. FITS ALL STANDARD UNIT TYPE FIRST AID KITS. When advisable can be carried on the person in belt pouch. Write for details.

*Patented

Accepted for advertising in publications of the American Medical Association.

Medical Supply Company

"It pays to buy—from Medical Supply"

ROCKFORD, ILLINOIS • IN CANADA, IT'S SAFETY SUPPLY CO.

27-30 American Society of Mechanical Engineers, annual conference, petroleum division, Rice Hotel, Houston.

Sept. 27-Oct. 2 American Society for Testing Materials, Committee D-2 on petroleum products and lubricants, Shoreham Hotel, Washington, D. C.

28-29 Independent Natural Gas Association of America, Shamrock Hotel, Houston.

Sept. 30-Oct. 2. American Association of Petroleum Geologists, Mid-Continent regional meeting, Masonic Building, Wichita.

OCTOBER

1- 2 Mid-Continent Oil and Gas Association, Louisiana-Arkansas division, annual meeting, Roosevelt Hotel, New Orleans.

4- 6 American Association of Oilwell Drilling Contractors, thirteenth annual meeting, Cosmopolitan Hotel, Denver.

6- 7 Texas Mid-Continent Oil and Gas Association Rice Hotel, Houston.

7- 9 National Association of Corrosion Engineers, south central region, Mayo Hotel, Tulsa.

8- 9 California Natural Gasoline Association, annual fall meeting, Ambassador Hotel, Los Angeles.

11-17 Oil Progress Week.

19-20 Independent Petroleum Association of America, annual meeting, Texas Hotel, Fort Worth.

22-23 Western Petroleum Refiners Association, regional meeting, Garrett Hotel, El Dorado, Ark.

22-24 Gulf Coast Association of Geological Societies, third annual convention, Shreveport.

24 Natural Gasoline Association of America, regional meeting, Blackstone Hotel, Tyler, Tex.

26-29 American Gas Association, annual conference, Kiel Auditorium, St. Louis.

27 Association of Consulting Chemists and Chemical Engineers, Inc., annual meeting, Hotel Belmont Plaza, New York City.

29-31 Rocky Mountain Oil and Gas Association, annual convention, Cosmopolitan Hotel, Denver.

NOVEMBER

3- 4 Society of Automotive Engineers, national diesel-engine meeting, Conrad Hilton Hotel, Chicago.

5- 6 Society of Automotive Engineers, national fuels and lubricants meeting, Conrad Hilton Hotel, Chicago.

5- 6 American Association of Petroleum Geologists, Pacific section annual meeting, Hotel Biltmore, Los Angeles.

9-11 Geological Society of America, annual meeting, Royal York Hotel, Toronto, Ont.

9-12 American Petroleum Institute, annual meeting, Conrad Hilton Hotel and Palmer House, Chicago.

12-13 Society of Exploration Geophysicists, midwestern meeting, Adolphus Hotel, Dallas.

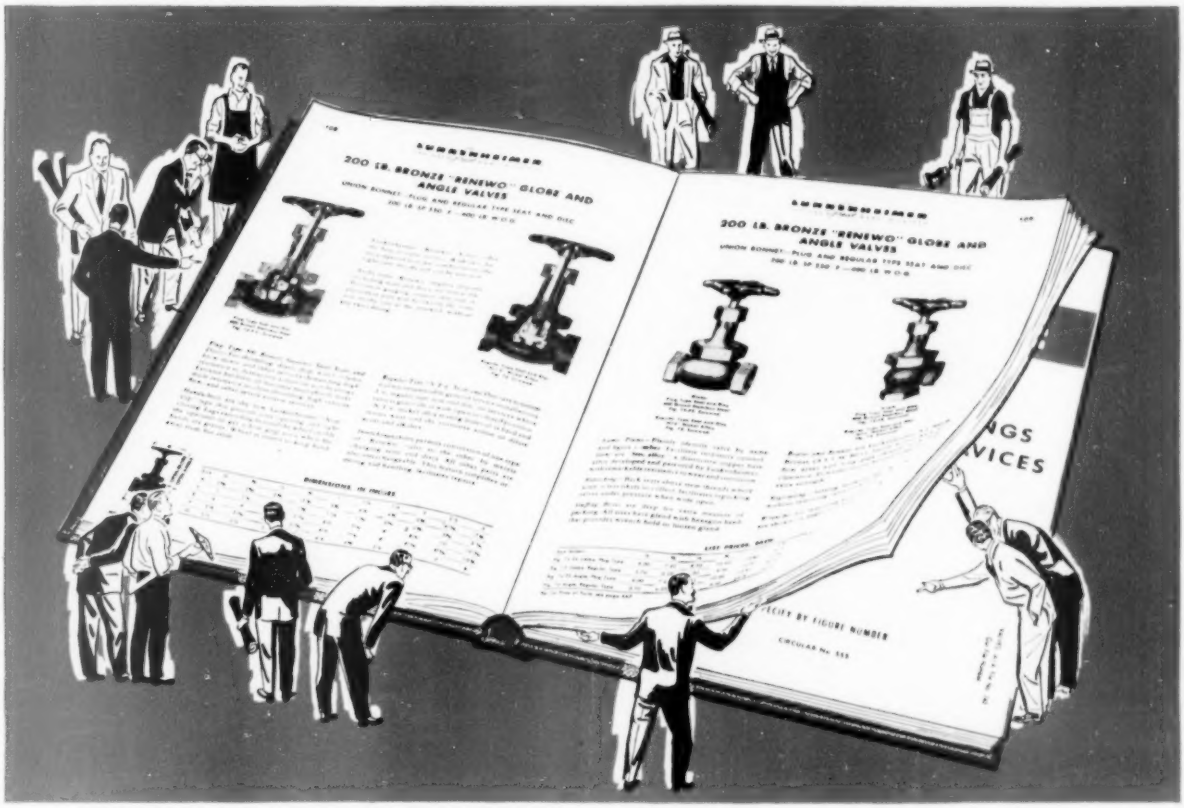
19-20 Annual Instrument Short Course, Los Angeles Harbor Junior College, applied technology division, Wilmington, Calif.

21 National Gasoline Association of America, regional meeting, Herring Hotel, Amarillo, Tex.

DEC.

13-16 American Institute of Chemical Engineers, annual meeting, Hotel Jefferson, St. Louis.

New 500-Page LUNKENHEIMER Catalog



Most Complete Valve Reference Work in Print!

The unique three-color, quick-reference Guide section of this new catalog makes it actually two volumes in one! Just refer to the Guide, where valves are grouped by pressure classes for easy comparison . . . the number of the page which includes complete details is printed under each illustration.

A handy four-way index is also included for your convenience. All the thousands of products in the complete Lunkenheimer line are described fully — with sectional and exterior views, sizes, dimensions, parts, prices, recommended uses, and performance. In addition, you'll find more than 100 pages of engineering data at your fingertips.

The new Lunkenheimer Catalog is so important that it is being distributed personally. When your copy is delivered, be sure to go over it briefly with the representative who brings it to you. He can show you how to take full advantage of all the features which save you time and trouble in ordering.

The Lunkenheimer Company
Box 360F
Cincinnati 14, Ohio

BRONZE • IRON • STEEL

LUNKENHEIMER®

THE ONE *Great* NAME IN VALVES

L-353-12

NOW! the same dependable REED quality

REED is pleased to announce the addition of **REED** Tool Joints, flash welded to drill pipe, to its line of tool joints. This addition gives to the industry a selection of any type pipe connection desired, manufactured to **REED** quality specifications.

The latest type machines developed for flash welding tool joints to drill pipe have been installed. Centering and holding devices keep the drill pipe and tool joint (pin or box) in accurate alignment. This is extremely important, as the whip in a mis-aligned drilling string is both costly and dangerous.

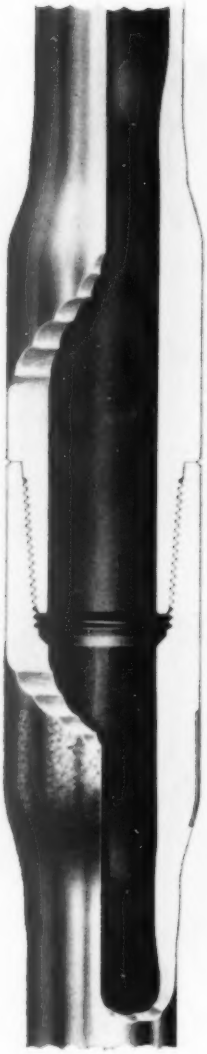
Full hole, semi-internal flush and internal flush types are available, with either the conventional square shoulder or with 18° taper. All **REED** Tool Joints have pre-lubrication infused into the threads to prevent galling. "Reedite," a tungsten carbide facing material developed by **REED**, may be had upon request.

there is a **REED** *tool joint connection to meet your every requirement*

REED

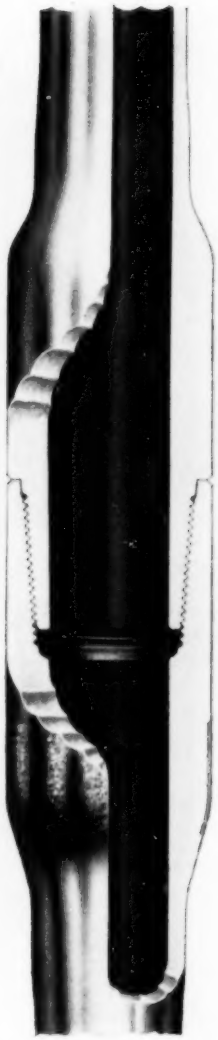
in REED TOOL JOINTS

flash welded to drill pipe



REED
SEMI-INTERNAL FLUSH
TOOL JOINTS
FLASH WELDED
TO DRILL PIPE

REED
FULL HOLE
TOOL JOINTS
FLASH WELDED
TO DRILL PIPE

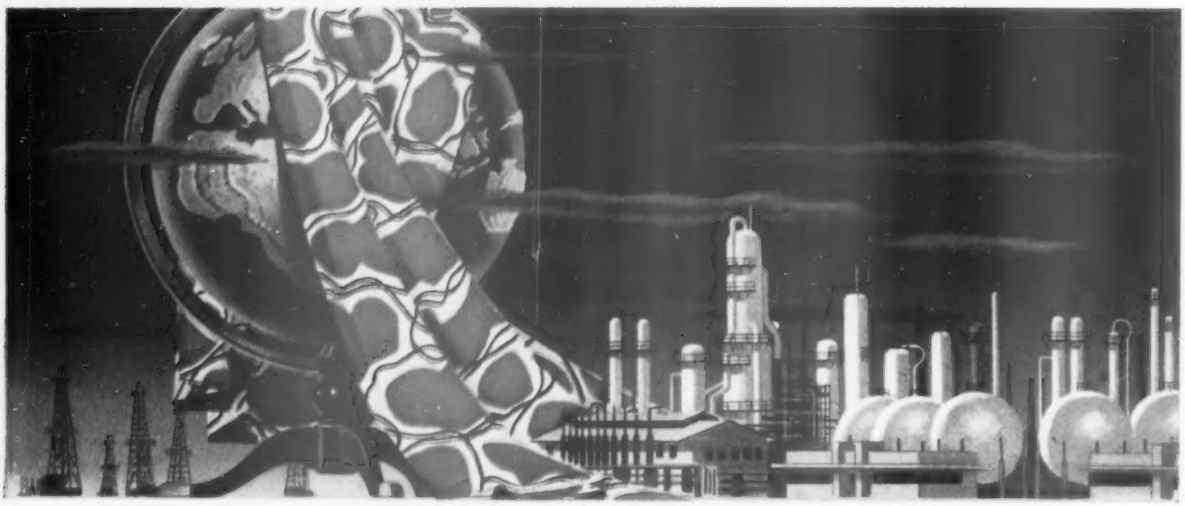


REED
INTERNAL FLUSH
TOOL JOINTS
FLASH WELDED
TO DRILL PIPE

ROLLER BIT COMPANY
HOUSTON 1, TEXAS

3052

Celanese creates new horizons for industrial chemistry

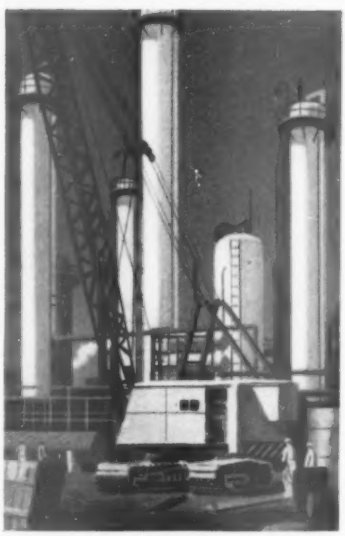


The rapid rise of Celanese Corporation of America from an obscure beginning to its current unique position, typifies the success saga of American business. In more than a casual sense, the Celanese story is that of the world's chemical plastics and textile industries. As a result of its infinite drive for perfection, the American people of every economic level are better dressed than any other nation of the world.

Celanese Corporation's integration program embraces affiliates in Europe, the Orient, Latin America, and extensive expansion of already vast operations in Canada and the United States.

On the domestic front, Celanese is enlarging its scope in the production of raw materials for the chemical, plastics and petrochemical fields, and developing fibers to put new emphasis on industrial synthetics.

Brown & Root feels signally honored to have been selected to design, engineer, and construct plants in three different nations, for Celanese Corporation of America. This is another example of the greatest names in American industry benefiting from Brown & Root's extensive experience in process engineering and construction.



BROWN-BILT

BROWN & ROOT, INC. *Engineers · Constructors*

P. O. BOX 3, HOUSTON 1, TEXAS

CABLE ADDRESS — BROWNBILT

Associate Companies:— BROWN ENGINEERING CORP. • BROWN & ROOT MARINE OPERATORS INC.

THE OIL AND GAS
JOURNAL
TULSA, OKLAHOMA

Published every Monday by The Petroleum Publishing Co., 211 S. Cheyenne, Tulsa, Oklahoma. Phone 3-6291. Founded in 1902. Name changed to The Oil and Gas Journal in 1910 by Patrick C. Boyle.

•

P. C. Lauinger, President; S. H. Rourke, Executive Vice President; Mitchell Tucker, Vice President and Advertising Manager; Hanson B. Pigman, Circulation Manager; Donald W. Wilson, Manager, Industry Census Department; J. Parker Holland, Production Manager.

EDITORIAL STAFF

Kenneth B. Barnes, **Editor;** Henry D. Ralph, **Chief Editorial Writer;** Ted A. Armstrong, **News Editor;** George H. Weber, **Refining Editor,** 500 Fifth Avenue, New York; Dahl M. Duff, **International Editor,** 500 Fifth Avenue, New York; Gerald L. Farrar, **Engineering Editor;** Paul Reed, **Pipe-Line Editor;** W. L. Nelson, **Technical Editor;** Philip C. Ingalls, **Exploration Editor;** C. O. Willson, **Consulting Editor;** R. B. Tuttle, **Equipment Editor.**

Associate Editors: Lynn M. Nichols, Neil Williams, and John C. Casper.

District Editors: TULSA: Joseph A. Kornfeld, John C. Reidel, William P. Sterne, Robert J. Enright, Carl Hoot, and John C. McCaslin. HOUSTON, Sterling Building: F. Lawrence Resen and C. Malcolm Davis. LOS ANGELES, 650 South Grand Avenue: D. H. Stormont. WASHINGTON, D. C., 621 Albee Building: Bertram F. Linz. MIDLAND, TEX., McClintic Building: Roy F. Carlson. CHATHAM, ONT., 35 Stanley: Victor Lauriston.

Editorial Assistants: Carolyn Carter, Tulsa, and Martha Allbright, Tulsa.

Correspondents at Denver, Pittsburgh, Calgary, Columbus, Ashland, Ky., Oil City, Pa., and Mount Pleasant, Mich.

Advertising Offices: TULSA, John D. Reilly, Mid-Continent Manager and George O. Ruppert, Representative, 211 South Cheyenne, Phone 3-6291; NEW YORK: Charles A. Wardley, Eastern Manager, and Robert N. Caird, Jr., Representative, 500 Fifth Avenue, Phone LOngacre, 4-1750; CHICAGO: E. S. Klappenbach, Midwestern Manager, and David T. Kenney, Representative, 105 West Madison Street, Phone Central 6-2537; PITTSBURGH: Alfred M. Jones, Manager, 429 Fourth Avenue, Phone Atlantic, 1-4835; HOUSTON: John M. Spears, Gulf Coast Manager, Sterling Bldg., Phone CHarter 4626; LOS ANGELES: Donald O. Hanson, Manager, 650 South Grand Avenue, Phone Vandike 0722; ENGLAND: Harry Becker, European Representative, 111 Thorley Lane, Timperley, Cheshire, Phone Ringway 4702.

•

Subscription rate to the petroleum industry, United States and foreign, 1 year, $4.00. Single copies, 50 cents. Back copies when over a year old, one dollar. Note: Payments from outside the U.S.A. may be in the form of an international money order or check on a U.S.A. bank. Entered as second-class mail matter at Tulsa, Okla., under Act of March 3, 1879. Copyright 1953 by The Petroleum Publishing Co.

Member
Audit Bureau of Circulations
Associated Business Papers

JOURNALLY Speaking

Indiana Dressing

OIL companies get into all kinds of things, and one of the biggest, Standard Oil Co. (Ind.), has just got out of a flier in the French-dressing business with a net profit to stockholders of $88.55.

This was not, as you might first suppose, an attempt to find a market for a petroleum derivative in making salads more tasty. It was an attempt to develop some potential competition for Standard by aiding small business. In this case it was very small business. The company sponsored Tastee Treats Co., a Chicago corporation formed to manufacture and sell a special brand of French dressing. Tastee Treats sold 276 shares of stock at 50 cents a share to 123 stockholders. It had 12 employes, all of whom were directors in the corporation. After 8 months of successful operation, the firm was liquidated and all stockholders got their money back plus a dividend of 10 cents a share—a profit of 20 per cent.

Why liquidate such a profitable operation? Because vacation time was approaching. You see, Tastee Treats Co. was formed, owned, and operated by Chicago high-school students. It was one of 1,266 similar corporations participating in the nation-wide junior achievement contest. The firm's 16-year-old girl president won the prize offered by the New York Stock Exchange for the best annual report.

These junior achievement corporations are formed in the fall and liquidated at the end of the school term, not so much to make a lot of money as to find out a lot about how money is made. The kids get management counsel from their sponsoring firms, but they run their own companies themselves, and they handle all the problems of meeting a payroll, paying taxes, bucking competition, keeping down overhead, abiding by laws and regulations, and other headaches of businesses large or small.

The whole idea is to teach the principles and practices of American enterprise and to raise a new generation of competitive businessmen. On this basis Indiana Standard is quite pleased with its French-dressing venture, even though it didn't own any of that stock that paid 20 per cent in 8 months.

Petroleum Chemicals

WE were pleased to note an announcement that the name of the Petroleum Chemicals Department, Industrial Chemicals Division, American Cyanamid Co., has been changed to Refinery Chemicals Department. This should be a step in clearing away some of the confusion and ambiguity over the term "petroleum chemicals."

Long before chemicals were made *from* petroleum to any important extent, chemicals were made *for* the petroleum industry in considerable variety, notably for use in refining. A number of companies were and are engaged in the manufacture of what many of them choose to call petroleum chemicals, the name deriving from the intended market rather than the source of the raw material.

Now that such an infinite variety of chemicals is being produced from petroleum, there has been some confusion between the two classes of products. Years ago our favorite oil publication coined the word "petrochemicals" to fill the need for a distinctive, one-word designation for chemicals derived from oil or natural gas. The word has caught on widely, but still many people fail to make a distinction between petrochemicals and petroleum chemicals. So, with our passion for clarity and definitiveness in terminology, we welcome any movement toward calling refinery chemicals what they really are.

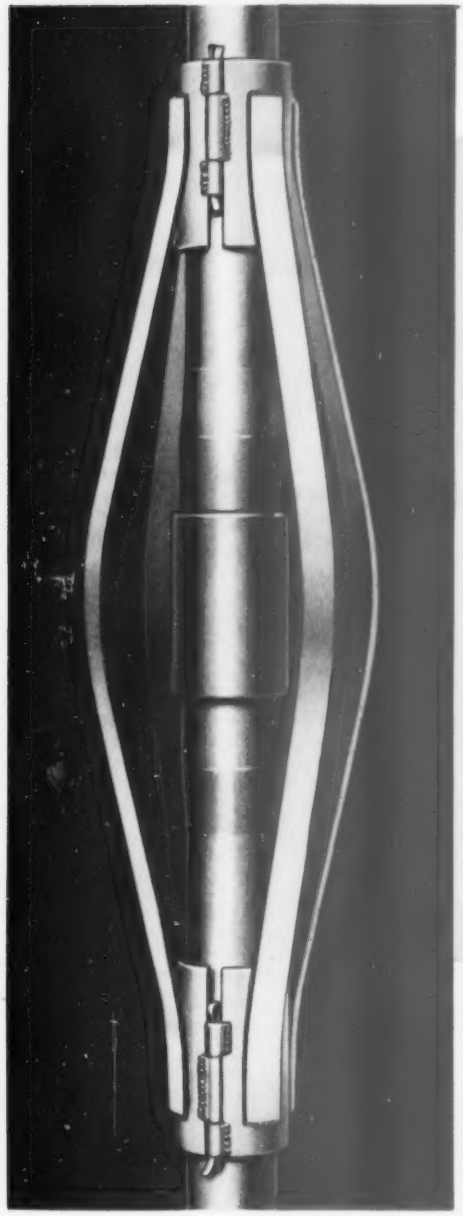
Petrochem World

A NEW petrochemical is now being made into a balloon-like globe of the world which can be deflated and carried in the pocket and then blown up to any size map you need to settle an argument, such as on the size of Texas. Who says oil is making the world smaller?

Henry D. Ralph

Do your tubing string a favor...specify

BAKER Hinge-Lok Tubing Centralizers



When ordering tubing centralizers, specify

Baker Hinge-Lok Tubing Centralizers

Product No. 9151, and state the nominal O.D. of the tubing string on which they are to be run.

Here is a check list of nine good applications for Baker Hinge-Lok Tubing Centralizers. Undoubtedly you can add a few from your own experience.

- *For protecting couplings.*
- *For extending the life of tubing and casing by protecting it from excessive wear.*
- *For facilitating the running of tubing—especially in directional wells, where the sled-runner effect of the centralizer springs reduces the drag.*
- *For running on tubing above a Baker Retainer Production Packer to ensure proper centering, easier reentry of the tubing in the bore of the Packer, and elimination of any tendency of the tubing to bind in the Packer bore.*
- *For centering the tubing above a Baker Retainer Production Packer set between two zones to ensure that the tubing will not become sanded up in an extreme off-center position and thus to provide assurance that washing over can be accomplished without complications.*
- *For centering the tubing opposite the upper perforations of dual-zone completions to permit uniform entry of the fluid into the casing and to provide a protective cushion against the sandblasting action of the entering fluid.*
- *For cementing strings of tubing in gas-storage projects.*
- *For solving pumping problems in deep wells and in unusual pumping wells.*
- *For minimizing wear on pumping strings caused by the constant rubbing of the tubing against the bore of the casing as the tubing "breathes."*

When choosing tubing centralizers, remember that Baker Hinge-Lok Tubing Centralizers are:

Hinged for easy mounting.

Easily installed on either plain-end or external-upset tubing as it is being run.

Installed around a coupling. (The collars of the Tubing Centralizer are sufficiently large inside to permit them to slide over the ends of external upset tubing and bump against the coupling.)

Always pulled—NEVER PUSHED.

BAKER OIL TOOLS, INC.

HOUSTON • LOS ANGELES • NEW YORK

Same cast, same plot, same problem for oil

WHAT a fuss is being raised over 2 cents! Because the retail price of gasoline in some places went up as much as 2 cents per gallon following the crude-price increase of 25 cents per barrel, a congressional committee is investigating the entire oil industry.

A wide variety of charges has been fired at the industry, such as: absence of competition, collusion to restrict production and fix prices, defiance of the law of supply and demand, excessive profits, attempts to squeeze out independent marketers, discouraging consumers from using heating oil, making a deal to exclude imports, and sabotaging the administration's attempt to balance the budget.

An equally wide variety of remedies has been offered by eager volunteers. These range from repeal of state conservation laws to creation of a super-duper federal agency to regulate the entire petroleum industry from top to bottom as a public utility.

TO anyone familiar with the functioning of the oil industry, the charges and the remedies are absurd. Also, they have a familiar ring. The same subjects have been chewed over many times in many forums, including this same congressional committee.

It is probable that nothing more concrete will come out of this investigation than has come out of its predecessors. Nevertheless it is discouraging to the industry to be haled before a court of inquisition at every fluctuation in the market, to always be considered guilty until it proves itself innocent, to see the same old ghosts and fables raised time after time, and to realize that people in high places are unable or unwilling to understand the true facts of how the industry operates.

BUT if congressmen and others with special axes to grind fail to learn anything from such repeated investigations, the current pillorying of the oil industry should clinch some things with oil men.

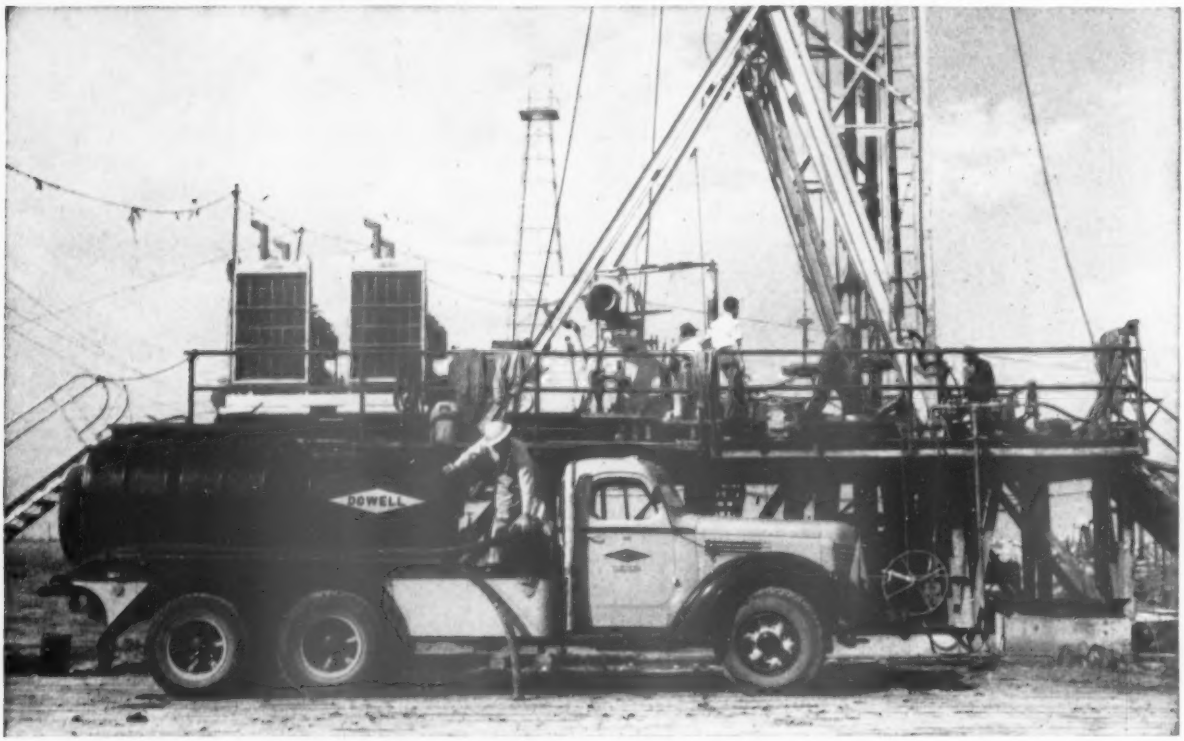
It is a sharp reminder that oil is vested with a public interest, not in the legal sense of a public utility but in the sense of an intense public curiosity. The industry must live in a gold-fish bowl, with nothing hidden from public scrutiny.

It is another warning that a large part of the public distrusts private industry in general and the oil industry in particular, and that business is still suspected of all the sins of past generations.

It demonstrates again that the industry must keep everlastingly at the job of public relations and courting the good will and understanding of its customers, its competitors, and the general public.

DOWELL MUD ACID OPENED UP CRITICAL ZONE

Well flowed 25 barrels of oil per hour after chemical treatment helped solve completion problem



Production suffers when the critical area of a well is blocked. Eliminating the blocking materials so that the well can flow freely often presents a major problem to oil producers.

Here's an answer! Dowell Mud Acid is a special acid solution that dissolves bentonite and similar silicate materials. It has been used successfully for many years to remove mud, mud cake, silicate materials and calcareous deposits from screens, slotted liners and formation pores.

Take the case of a well that was completed by perforating from 11,890 to 11,928 feet. It would not come in even after repeated washing and swabbing. Then, a Dowell Mud Acid treatment was recommended. Following the application of the Mud Acid, the well flowed 25 barrels per hour through a $\frac{3}{4}$-inch choke.

This is but one example. There are many others, where Dowell Mud Acid has spelled the difference between profit and loss. Results show that cement squeeze jobs are more often successful if Mud Acid is used ahead of the cement. And many operators use it to help free stuck drill pipe.

If you'd like to know more about Dowell Mud Acid, and if you're interested in learning more about Dowell's many other oil field products and services, be sure to contact your nearest Dowell office soon. Or, write directly to Tulsa, Dept. G11

DOWELL SERVICE

Acidizing • Perfojet • Electric Pilot • Paraffin Solvents • Fracturing • Corban® • Jelflake® • Bulk Inhibited Acid • Chemical Cleaning for Heat Exchange Equipment

DOWELL INCORPORATED • TULSA 1, OKLAHOMA

A Subsidiary of The Dow Chemical Company

"First in Oilfield Acidizing . . . Since 1932"

Look to **DOWELL**

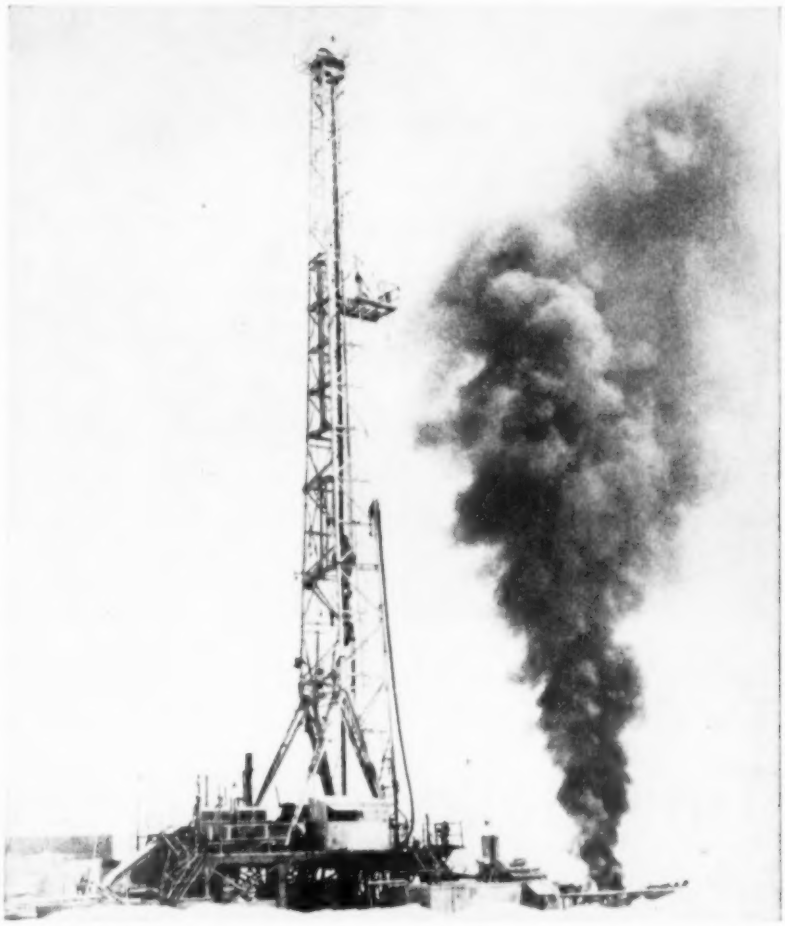
FOR OIL INDUSTRY CHEMICAL SERVICE

THIS WEEK

INTERNATIONAL.—Gulf announces 25-cent increase in price of Kuwait crude, bringing it to $1.75 a barrel. . . . Other companies operating in Middle East fail to follow suit immediately. . . . ¶Third well on Wafra structure expected to be spudded in this week by American Independent. . . . Second well testing Zubair formation but will complete in Burgan sand if Zubair is unproductive. . . .

PRICES.—Oil-company executives defend crude and products price increases before House committee, say adjustment was long overdue and still isn't enough. . . . Committee, especially members from consuming states, are unconvinced by argument that higher prices are needed to provide incentive to find oil which will be needed in the future, say consumers should not be charged now for supplies to be delivered years hence. . . . Phillips executive says cost of finding and producing oil has jumped 50 per cent in last 5½ years, requiring a price hike of $1.25 a barrel to recover that added expense. . . .

REFINING.—Shell chooses Anacortes, Wash., 40 miles south of Canadian border on Puget Sound, as site for its new Pacific Northwest refinery. . . . The 50,000-bbl. plant, biggest yet in the area, boosts announced new capacity on both sides of the border by 140,500 bbl. daily since plans for the big Trans Mountain crude line jelled. . . . ¶Royalite Oil begins construction of 5,000-bbl. refinery at Kamloops, B. C. . . . Crude-distillation unit is expected to go on stream this fall, with cat cracker to be added late next year. . . . This plant, too, will process crude from the Trans Mountain line. . . . ¶Union Oil Co. directors approve $40,000,000 expansion and modernization of company's Oleum refinery in California. . . .



ONE OF THE FIRST photographs from the new producing area of the Middle East, the Kuwait-Saudi Arabia Neutral Zone, is this made by American Independent Oil Co. of its Wafra 4, the discovery well. The rig is now on a 2¼-mile confirmation well, due for completion early this week, and is scheduled to be skidded for spudding in the third well on the Wafra structure within a few days. The discovery of oil by Aminoil in March climaxed a $30,000,000 search in the Neutral Zone which began in 1949 and which saw five consecutive dry holes drilled.

GOVERNMENT.—Bill introduced in Congress would grant 5-year amortization to all industrial facilities built or acquired after the end of this year. . . . Sen. Homer Capehart, author, says bill would encourage industry to expand and would serve to forestall depression and discourage inflation. . . . ¶State of Arkansas takes tidelands law into federal court in effort to get it declared null and void. . . . Other states have met to discuss plans to support suit. . . .

PIPE LINES.—Magnolia Pipe Line announces plans to replace multiple 8-in. crude line now in service between Ringgold and Corsicana, Tex., with 154-mile, 16-in. trunk. . . . New system will carry at capacity 80,000 bbl. of crude daily from North Texas and Oklahoma producing areas to the Corsicana terminus. . . . ¶Products Pipeline Co., subsidiary of Indiana Standard, begins construction of 207-mile, 10-in. products line from Mandan, N. D., site of Standard's new refinery in the Williston basin, to Fargo, N. D., and Moorhead, Minn. . . . ¶Salt Lake Pipe Line to expand capacity of its 566-mile products line from Salt Lake City to Pasco, Wash., by 20 per cent. . . .

ACTIVITY.—Production of crude and lease condensate averaged 6,447,225 bbl. daily for week ended July 4, down 6,200 bbl. daily. . . . ¶Total well completions for the week set a new all-time record at 1,003 wells. . . . ¶Wildcat completions totaled 233 compared with 230 for previous week and 179 for corresponding week last year. . . .

TRENDS.—Rotary rigs operating in United States on July 6 totaled 2,695 for an increase of 53 rigs over the previous week and 78 rigs over corresponding week last year. . . . For 12 months the number of rigs reported each week has been under the previous year because of the steel shortage following the strike last summer. . . . ¶Well completions for the first half were near the 1952 level despite the weekly average of 2,536 rotary rigs this year compared with 2,752 for same weeks last year. . . .

RESEARCH TEAM which developed Microballoons: Richard D. Croft, Dr. Frank Veatch, at microscope, and Ralph W. Burhans. Several million balloons constitute powdery pile in foreground.

MICROSCOPIC VIEW of the plastic balloons, illustrating range in size. Spread an inch thick over a liquid surface, they form a foam which virtually shuts out air and greatly reduces losses of crude oil due to evaporation.

IN LABORATORY EXPERIMENT foam like this has stood for more than 2 years without any sign of deterioration. Researcher Richard Croft measures float of Microballoons.

Tiny Balloons Cut Evaporation

Ohio Standard reveals new foam product which reduced loss by 86 per cent in tests; quick payout is indicated

Gerald L. Farrar

CLEVELAND. — Evaporation losses in crude-oil storage tanks can be reduced 80 to 90 per cent by covering the liquid surface with an inert, floating-blanket layer of microscopic hollow plastic balls called Microballoons.

This discovery, announced by officials of the Standard Oil Co. (Ohio) here last week, is the result of large-scale tests conducted for several years to find ways to reduce storage-tank evaporation losses.

While Sohio does not yet know what the Microballoon foam will cost in commercial manufacture, it is expected that crude-oil savings resulting from its use would give the new method a payout on the order of a year and possibly less.

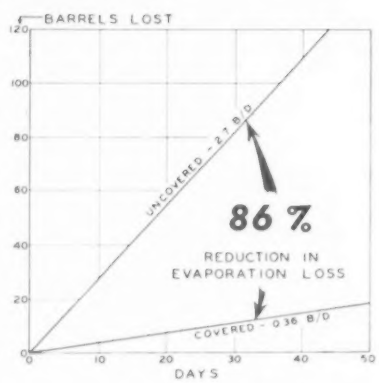
Typical results obtained by direct gaging show an 86 per cent reduction in evaporation loss from crude oil in 88-ft. diameter cone-roof storage tanks with about 2 weeks working frequency. This is shown graphically in the accompanying chart. The layer of Microballoon foam in these tests was about 1 in. thick.

Easily installed . . . Microballoons are easily installed in conventional cone-roof storage tanks, with little or no tank modification. The fluidity of the foam layer enables it to flow around supports, swing lines, and other deadwood in the tank, while keeping the liquid surface sealed as the level moves up and down in the tank. The layer acts as a fluid floating roof.

Microballoons are small, hollow, spherical particles, usually made of plastic, which contain sealed-in gas at about atmospheric pressure. The general characteristics of the material can be varied over considerable ranges of size, density, and composition.

Typical properties of a material currently being extensively field tested are as follows:

Bulk density	8.7 lb./cu. ft.
Particle density	20.6 lb./cu. ft.
Average particle size	0.0013 in.
Size range	0.0002-0.0036 in.



SAVINGS POSSIBLE with Microballoons, as shown by Sohio's experiments. Control tanks in normal use showed an evaporation loss of 2.7 bbl. daily, or more than 80 bbl. a month. Studies indicated that foam-covered tanks would show an evaporation loss of only 0.36 bbl. a day, or about 11 bbl. a month.

This particular product is made from a phenolic resin. The sealed-in gas is essentially nitrogen.

Storage conditions . . . Relative value of Microballoons covering as a conservation technique is increased when conditions which increase evaporation

losses are encountered. These include higher storage temperatures, poor tank conditions, frequent working, etc. These findings have resulted from tests with worked and static tanks of various sizes and conditions.

Examinations after 2 years of use show little or no deterioration of the foam layers. An installed layer is therefore expected to last a number of years before replacement is required. Present experience indicates that very little maintenance is needed.

Installation . . . Microballoon coverings are installed in the tanks by pouring the dry powder through open hatches. Usually some form of surface agitation or an oil spray has been used to help spread the covering initially. The type of equipment used to blow insulation into walls of buildings is currently being investigated. Preliminary results are promising.

The difficulty of reading accurately a gaging tape dropped through a layer of viscous foam is eliminated by use of a simple floating-well attachment on the tape line. In a number of cases the floating wells have been permanently installed in the tanks.

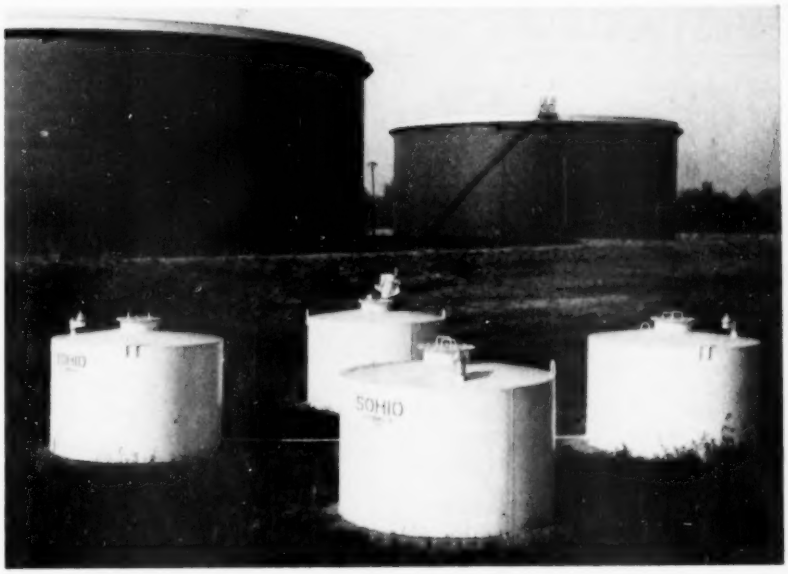
Quantity required . . . Most of the large-scale test work has been done with a 1-in.-thick layer of Microballoon foam. The optimum economic thickness is not yet sharply defined. For large tanks it will probably be in the region to 0.5 to 1 in. For a given thickness of foam layer, the quantity required is proportional to the square of the tank diameter. For the product currently being used the following quantities are needed for 1-in. foam layers:

Tank diameter, ft.	Foam required, lb.
20	250
50	1,600
100	6,000

Tank modification . . . Little or no tank modification is required for the installation and use of Microballoon foams. Where needed, some protective techniques or devices may be employed to prevent accidental loss of the covering into pipe lines.

Loss of the foam covering into a pipe line, however, will not disrupt the pipe-line operation. The particles are so small that liquid suspensions can be pumped through precision pumps without damage. Hydraulic pressures of a few hundred pounds per square inch in the lines are sufficient to collapse the particles, making them even smaller. They would eventually end up in tank b.s. and w. This would also be true of any foam material which deteriorates in service in the tanks.

Some trials will be made where no roof of any kind other than the Microballoon covering is employed on the tank. This technique may prove workable in some localities, but not in others, Sohio engineers believe.



EXPERIMENTAL TANK FARM used for initial development work on Microballoons in actual field use. Note man on small tank at rear.

Availability . . . Up to the present time Microballoons have been manufactured and tested on an experimental basis. They should be available in substantial quantity within a few months. Experimental samples can be obtained from Sohio.

Firm cost quotations are not yet available. A preliminary figure of 80 cents per pound has been used for economic calculations.

Microballoons currently being tested are made from a phenolic resin. Resins of this nature are made from phenols or substituted phenols and either formaldehyde or furfural. These materials react to give plastic-like polycondensations products. Final product is composed of phenol molecules, linked together by either methylene ($—CH_2—$) or dimethyl ether groups ($—CH_2—O—CH_2—$).

The phenolic resins are thermosetting materials, in that final preparation is made by molding a powder under high pressure and at high temperature. The powder fuses to a solid mass, and will not again soften on application of heat.

CANADA

Refinery Started

Construction under way by Royalite on Kamloops plant

ROYALITE OIL CO., LTD., of Calgary, Alta., has begun construction of a 5,000-bbl. per day refinery at Kamloops, B. C. The new plant will process Royalite crude, transported by Trans Mountain Pipe Line from the Redwater field, Alberta.

Initial operation of the crude distillation unit will commence this fall. Later, the company will add a modern catalytic cracking unit with completion scheduled for late 1954. The new Royalite plant will serve interior British Columbia with fuel products. Contract has been awarded to Columbia Engineers, Ltd., for design and construction.

Royalite has an interest in another 5,000-bbl. per day refinery which commenced operations last March in the Coleville field of southwestern Saskatchewan. Refinery Operators, Ltd., of Calgary, under an agreement with Royalite are operating the topping plant for production of heavy fuel oil and straightrun gasoline, distillates, road oils and asphalts. Principal product from the 13½° A.P.I. gravity crude is heavy fuel, which is being delivered to Canadian National Railways for consumption in oil-burning locomotives.

The small skimming plant will shortly incorporate facilities for manufacture of oxidized asphalts. Coleville production, discovered less than 2 years ago, now comes from more than 100 wells producing from the Banff sand at about 2,735 ft.

Refinery Site Chosen

Shell announces it will build 50,000-bbl. plant on Puget Sound at Anacortes, will be biggest in Pacific Northwest

ANACORTES, Wash.—Shell Oil Co. has selected Anacortes, Wash., as the site for its new refinery in the Pacific Northwest.

Preliminary plans call for construction of a plant with a capacity of 50,000-bbl. daily—about 15,000 bbl. daily bigger than any plant existing or planned in the region on either side of the international boundary.

R. W. McOmie, West Coast refinery coordinator for Shell and manager of its Wilmington, Calif., refinery, said here last week that engineering studies had shown the site, at March's Point on the outskirts of Anacortes, to have satisfactory harbor facilities and sufficient water and power.

Anacortes is on Puget Sound about 40 miles south of the Canadian border and 80 miles north of Seattle.

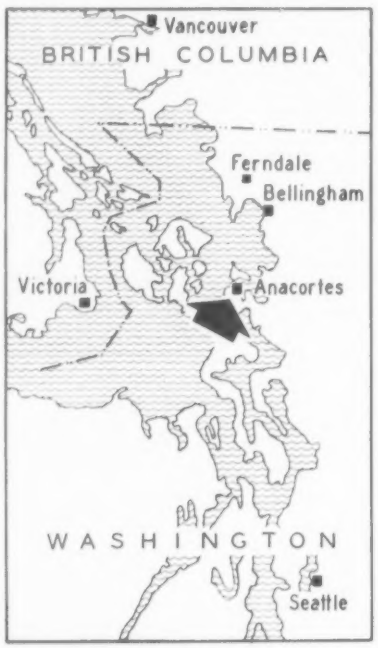
McOmie said the company already has picked up options on part of the required land and will take up those it holds on the remainder as speedily as possible. Clearing and preparing of site is scheduled to start as soon as this is done.

Design work and negotiations with construction contractors are well along. McOmie said recently that plant facilities would include catalytic cracking and reforming units *(The Oil and Gas Journal, June 15, page 183)*.

Capacity buildup . . . Shell's announcement followed by a week Standard Oil Co. of California's statement that it will build an 11,000-bbl. refinery across the border at Burnaby, B. C., adjacent to the firm's existing 8,350-bbl. plant near the western terminus of the big Trans Mountain crude line.

These two projects boost the total of expanded or new refinery capacity in the Pacific Northwest to approximately 140,500 bbl. daily since it was announced that the Trans Mountain trunk line would be built from Edmonton, Alta., to Vancouver, B. C. Plans now have been announced for construction of five new refineries and for expansion of two existing plants.

The new refineries are Shell's at Anacortes; General Petroleum Co.'s 35,000-bbl. installation at Ferndale, Wash.; California Standard's at Burnaby; Pacific Oil & Refining Co.'s 10,000-bbl. plant at Seattle; and the 5,000-bbl. Royalite Oil Co., Ltd., plant at Kamloops, B. C.



NEW SHELL REFINERY will be on Puget Sound directly opposite Victoria, B. C., on Vancouver Island and about 80 miles north of Seattle.

Imperial Oil, Ltd., is increasing capacity of its Ioco, B. C., refinery from the existing 12,000 bbl. daily to 34,500 bbl. daily, while Shell Oil Co. of Canada is doubling capacity of its 7,000-bbl. plant at Shellburn, B. C.

Drilling-Law Repeal Sought

REDONDO BEACH, Calif.—Oil operators leasing lands in the North Beach area here are pushing for a special city election to repeal an ordinance prohibiting drilling.

The North Beach area, which was heavily damaged in severe storms, early this year, lately has been the scene of an active leasing play. One block purchase is reported to have totaled more than $200,000. One of the largest purchasers has been Reserve Oil & Gas Co., San Francisco.

Storms, with the inevitable property damage, have occurred frequently in the North Beach area through the past 13 years and were the primary factor in the decision of residents to lease. R. C. Durant, president of the North Beach Property Owners Association, said the leasing is not "a bonanza" for the property owners, but a release from conditions for which there is no foreseeable remedy.

Oleum Expansion Planned

LOS ANGELES.—A proposed $40,000,000 expansion and modernization program for its 82,000-bbl. Oleum refinery has been approved in general by Union Oil Co.'s board of directors, Reese H. Taylor, president, stated in his monthly report to Union employes.

Preliminary engineering and process studies are under way, but it is expected actual construction will not start until early 1954. Purpose of the new units will be to increase the yield of gasoline and to obtain greater quantities of higher-octane gasolines.

Tentative plans call for construction of a catalytic reformer, a catalytic desulfurization unit, a coker, sulfur removal and processing units, and necessary auxiliary facilities. All units will not necessarily be constructed simultaneously, however, the report stated.

Exploration Permit Granted

SANTA BARBARA, Calif.—The California Lands Commission has approved an application by Richfield Oil Corp. for a permit to conduct offshore oil exploration in coastal waters off Santa Barbara County.

Under the permit, Richfield has the right to conduct operations for 3 months off the 50-mile stretch of coast between Point Conception and the City of Santa Barbara.

The commission said plenty of time would be allowed for protests from the Santa Barbara community, which has consistently opposed oil operations off its beaches.

Richfield officials said the company hopes to begin work in the area about the last of July.

They assured the commission that exploration work would not be conducted within 6 miles of the Santa Barbara city limits.

Wilmington Production Sold

LOS ANGELES.—Lincoln Petroleum Co. has purchased a 14-acre tract in Wilmington field from Macmillan Petroleum Corp. for about $200,000. The property has five wells producing about 100 bbl. of crude oil per day.

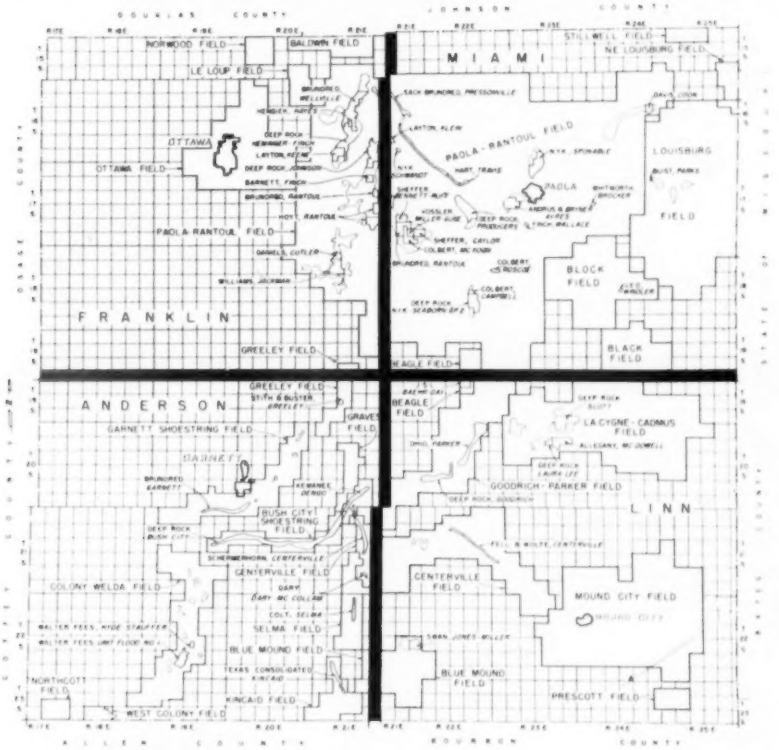
R. S. Macmillan, president of Macmillan Petroleum, said the sale of the

Wilmington production was part of a move by the company to centralize its production efforts.

He said recent drilling successes in Seminole and Logan counties, Oklahoma, where the company found production in seven of eight wells, and favorable surface geological and seismograph reports on 17 wildcat locations in Texas and Oklahoma, convinced the company that it should concentrate its activity in these areas. The firm also will continue to carry on operations on its concession in Sicily.

Lincoln Petroleum, which has sizable holdings in Del Valle field, intends to further develop its newly acquired Wilmington lease.

MID-CONTINENT



FOUR-COUNTY water-flood area in eastern Kansas. Light areas are oil fields. Enclosures within white areas are water-flood projects.

Water-Flood Center

Forty-nine floods now operating in four-county area of eastern Kansas, profitable in spite of thin formations

Kenneth B. Barnes

GARNETT, Kans.—This city is the hub of a 50-mile circle comprising one of the busy shallow oil-producing territories in the United States.

What makes it shallow are the 300-550-800-ft. depths for its Pennsylvanian age oil sands (Peru, Squirrel, and Bartlesville), and what makes it busy are the numerous water-flooding operations.

Water-flooding results and the variety of water-flooding practices were inspected July 8 by 300 visitors attending the annual Kansas-Oklahoma Water Flood Operators tour. The inspection group visited properties of Walter Fees, Deep Rock Oil Corp., Brundred Oil Corp. and a number of other operators in Anderson, Miami, Franklin, and Linn counties, Kansas.

Flood results . . . The shallow sands in this eastern Kansas territory in the vicinity of Garnett at best run some 20 to 30 ft. in thickness. A number of flood projects have been developed where the net pay averages only 15 to 10 ft. Nevertheless the flood recoveries have been satisfactory and good production from the developed properties is continuing.

By satisfactory is meant water-flood recoveries that run 2,000, 2,500, 3,000 bbl. per acre—and sometimes better. By comparison with ultimate water-flood recoveries at Bradford, Pa., or the "Golden Lane" Bartlesville sand flooding in Greenwood County, Kansas, these recoveries are rather low, and this because the sands are thinner, but correspondingly the development depths are only a third to a half of those in Bradford or Kansas' "Golden Lane." And the drilling and development costs accordingly are much lower for the Garnett, Kans., area.

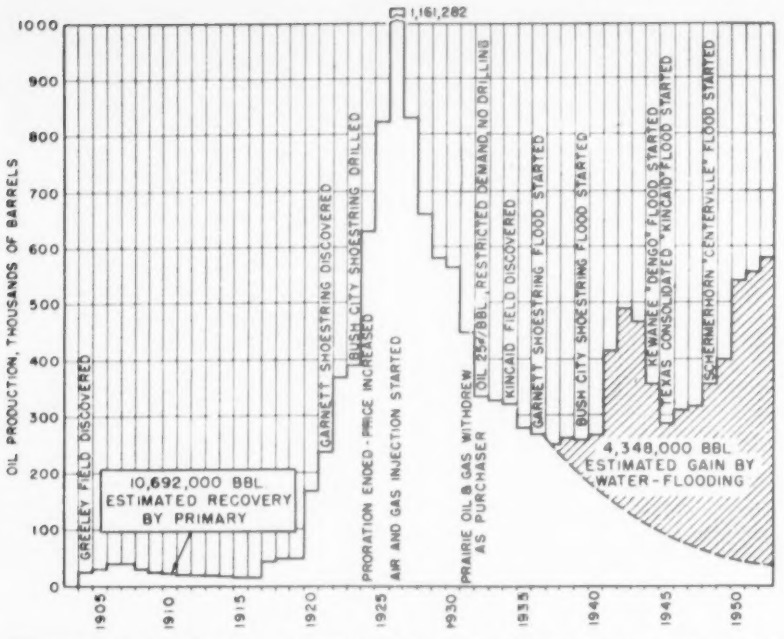
Since 1903, Kansas' Anderson County has had a primary recovery (estimated by U. S. Bureau of Mines) of 10,692,000 bbl., and 4,348,000 bbl. so far by water flooding. Miami County has had 11,024,000 bbl. primary and 2,790,000 bbl. by flooding to date; Franklin County, 6,682,000 and 2,145,000 bbl.; Linn County, 1,819,000 and 622,000 bbl.

Water flooding was legalized in Kansas in 1935, and the first water-flooding project in this four-county area was initiated by The Texas Co. in December 1935, in Linn County.

Fifty-six water-flood projects had been developed in the four counties by January 1953. The U. S. Bureau of Mines estimates the floods have recovered approximately 10 million barrels of oil that would not have been produced by the previous stripper pumping. About 7,900 productive acres had been flooded by these projects, and approximately 136 million barrels of water had been injected.

A measure of the activity that the five-spot water flooding has brought to these four counties lies in the fact that the water-input wells for all of the projects total 2,631. And, there are a total of 2,996 oil wells on these projects. Practically all of the 2,631 water-input wells represent new drilling, and at least 50 per cent of the oil wells were newly drilled for water-flood development, with the remaining oil wells being those which were put down in the original development 20, 30 or more years ago.

The U. S. Bureau of Mines at its Petroleum Experiment Station, Bartlesville, Okla., has followed in detail the many water-flood projects in the eastern Kansas-northern Oklahoma area. Coinciding with the 1953 annual Kansas-Oklahoma water-flood inspection trip July 8, the bureau released its Report of Investigations 4991, "Water Flooding in the Oil Fields of Anderson, Franklin, Linn and Miami Counties, Kansas," by J. P. Powell and J. L. Eakin. This report covers 56 water-flood projects in the four counties (49 projects now active). The following summarizes important features of these



PRODUCTION HISTORY of Anderson County, Kansas, showing effect of water-flooding operations on the county's oil production. Information plotted is to January 1.

projects as described by these bureau men:

Development . . . The usual type of well-spacing patterns are modified in flooding these shallow eastern Kansas shoestring fields. An elongated five-spot pattern is used. The water injection wells are spaced from 200 to 250 ft. apart across the narrow portion and from 500 to 600 ft. apart along the longitudinal axis of the field.

Practically all drilling is by portable, lightweight, cable-tool drilling machines. A well takes only 48 hours or so to drill.

Common practice here in completing water-input wells is merely to run a short string (20 to 40 ft.) of surface casing followed by a string of either 1½ or 2-in. tubing set on a rag packer and cemented with 10 to 15 sacks of cement at the top of the oil sand.

In most cases the water-injection pressure is raised high enough to produce the oil by flowing, and in this case the oil-producing wells are completed in about the same manner as the input wells. Some producing wells are temporarily equipped with insert pumps attached to strings of either ¾ or 1-in. tubing, for pumping by individual units.

Some floods have been converted from pumping the producing wells to flowing them, where it has been possible to increase the formation pressure to the extent necessary. The wells on some projects are converted to flow late in the life of the projects when the pumping costs become prohibitive because of the large volume of fluid produced. On other projects where the oil produced is of a comparatively high viscosity the fluid usually is lifted by individual pumping units so as to utilize fully the available pressure differential to move the oil through the sand and into the well bores.

The first few water-flooding projects in the Garnett area utilized fresh water from streams or ponds. Later, wells were drilled to obtain brine from deep-seated aquifers.

Water supply . . . One of the most interesting "water supply" aspects in the area is that of Brundred Oil Corp.'s (headquarters Oil City, Pa.) Garnett project, in Anderson County. During the early life of the flood, fresh water, purchased from the city of Garnett, was used for flooding. No treatment was made. Produced brine was collected in a pond at the main tank battery, settled, filtered, and injected into an Arbuckle limestone formation disposal well.

Later the injection of fresh water was discontinued, and the Arbuckle-limestone well was converted to a water-supply well. The well was equipped with a Reda pump, which forces the brine from the well to the top of a cascade-type aerating tower and into a settling pond. The pond is separated into sections by a series of baffles, to retard flow and allow time for completion of chemical reactions resulting from aeration and primary settling.

As the water flows into the second section of the pond, lime and alum are added to accelerate sedimentation of suspended matter. Copper sulfate and sodium hypochlorite are added to control growth of bacteria. Water is pumped from this section of the pond through a 6-ft. closed filter, in which anthracite is used as a filter medium, and into a 500-bbl. wooden clear-water tank.

The water then is pumped to the top of a vacuum deaeration tower to remove dissolved oxygen and thereby reduce corrosion of equipment. The tower is 30 ft. high by 3 ft. diameter and is filled with ceramic rings. A two-stage vacuum pump applies a vacuum of 26 in. of mercury.

The water is pumped from the base of the vacuum tower into the intake of a triplex pump, and then to the field distribution system, at 800 psi.

Experience has shown that the sands in the Garnett area of eastern Kansas respond more favorably to the injection of water after being shot with 1 to 2 quarts of nitroglycerin per foot.

Size of projects . . . The size of the water floods in these shallow shoestring pools varies widely. A good many were started on a "pilot" basis, and later expanded.

A fair number of the floods nevertheless are smallish, with input wells totaling only 10 to 25 or so. On the other hand, however, there are some really large floods, judged either from number of injection and producing wells operated, or acreage. Some of the larger floods have input wells totaling 108, 139, 160, 194, 196, 243, and 503.

Largest flood in the area is Deep Rock Oil Corp.'s Bush City shoestring project in Anderson County. This water-flood project stretches out for over 9 miles, and covering 1,475 productive acres. The formation flooded is the Squirrel sand at 620-800 ft., with thickness of 20 to 30 ft. This Deep Rock project has a total of 503 active input wells and 532 active oil wells.

Water injection on Deep Rock's Bush City project to first of this year totaled 18,753,040 bbl., and oil produced by water flooding correspondingly had been 1,614,066 bbl. Last year the oil production from this flood averaged 700 bbl. per day.

Deep Rock operates four water treating-pressure plants strung out along this Bush City shoestring operation—with all connected to the common distribution system. Each plant has a water-supply well producing from the Arbuckle limestone at 1,400 ft. This salt-water supply is treated, filtered, and then sent out into the distribution system to the injection wells at pressure of about 535 psi.

Pipe Still Tight

But the shortage in tubular goods hasn't been increased, as some expected, by the end of federal controls June 30

Henry D. Ralph

NO great change in the oil-country tubular goods supply situation is apparent to most operators in the Mid-Continent area since government controls were dropped on June 30.

Supplies are still very tight for the most desired sizes and specifications, causing a considerable lag between placing an order and obtaining delivery. In general, however, few operators are having great difficulty in maintaining their drilling programs despite the temporary inconveniences.

There is a general expectation that the situation will improve gradually over the next 6 months, and that by next winter supplies will be fully adequate with the possible exception of some high-strength pipe for deep wells.

N-80 bottleneck . . . The only real bottleneck at the moment, most operators say, is in N-80 goods, that is, pipe with high-strength characteristics imparted by alloys or heat treating. Such casing and tubing is almost imperative for deep wells with high reservoir pressures.

The more common specification, J-55, is in reasonably adequate supply in virtually all sizes. One reason for this is that practically all the imported tubular goods and so-called conversion pipe was J-55, and there never was a serious shortage of this type during the past couple of years.

While very little foreign and conversion pipe is now entering the market, domestic mills have increased their output of J-55, and its procurement is no problem. Some foreign mills are now stocking J-55 tubular goods at Houston, priced the same as out-of-stock domestic goods at Houston. While this price is higher than domestic mill prices in carload lots, it is far below what operators had to pay for foreign goods a year or so ago.

No scare buying . . . A few months ago when Congress was considering whether or not to extend materials controls beyond June 30, there was considerable apprehension that the end of controls would cause a big rush to build up inventories, thus creating an artificial shortage for several months. Apparently this has not happened.

The knowledge that tubular goods will gradually become more plentiful seems to have operated to prevent inventory accumulation. A number of the bigger companies say that they managed to get reasonably adequate inventories in recent months and their only problem now is to balance their stocks by obtaining more N-80 goods and working off supplies of J-55 material and the less commonly used sizes of casing.

Size complaints . . . Casing of 5½-in. diameter seems to be the scarcest item at present. Many purchasers complain that the tube mills try to get them to purchase certain quantities of large-size casing which they don't want in order to get the 5½ in. which is in greatest demand.

"A lot of pipe mills think we're still using cable tools," one operator says. "Years ago they set up their mills to turn out the various big sizes of casing needed for cable-tool drilling. Now, with rotary rigs, we use proportionately less casing in sizes above 7 in., but the mills haven't changed their ideas of what they ought to make."

A similar complaint is voiced about the shortage of N-80 tubular goods. "It's been like this for 10 years," said one purchasing agent. "The industry is drilling more deep wells all the time, but the pipe mills haven't kept up with the industry. They never have made enough high-strength tubing and casing. Some mills limit delivery of N-80 material to 13 per cent of their total sales, and that's not a high enough proportion to take care of our needs for deep wells. Maybe alloys will remain short for a long time, but the mills could meet the demand by putting in more heat-treating equipment."

Output increasing . . . The tubular-goods sales manager of a supply company says that his firm is increasing production but cannot operate at capacity because steel ingots are still in tight supply and will be until the end of this year. His firm is selling tubular goods of all weights and sizes as fast as produced, but he admits that the greatest demand is for smaller sizes and high-strength material.

He believes that there is no real shortage, and attributes the present tight market to three factors: return to regular suppliers in place of foreign and conversion pipe; balancing inventories by larger operators; and entry into the industry of a large number of small operators who must stock up complete new strings of tubular goods. These stringencies will work themselves out within the next few months, he believes.

This view echoes the prediction made before the oil-company buyers' group of the National Association of Purchasing Agents, meeting in Los Angeles in May, more than a month before controls ended. The speaker was Henry J. Wallace, vice president of National Tube Division of United States Steel Corp.

Reciting the growth and geographical dispersion of pipe mills in recent years, Wallace said that the pipe and tube mill capacity has increased 65 per cent since the end of the war, and there are now more than 100 producers.

"By January 1 of next year," he said, "total pipe and tube capacity will be capable of producing 13,800,000 tons annually. The biggest year of actual production was 1951, at 9,900,000 tons."

Ingot problem . . . The oil and gas industry consumes roughly half of all the steel pipe manufactured in this country, but not all of this is in the form of oil-country tubular goods—casing, tubing, and drill pipe. The present bottleneck in production is ingots, but Wallace said that ingot capacity has increased 13 per cent during the same period. He continued:

"The new mills have gone in so rapidly and in such volume that they have

IN THIS ISSUE . . .

Crude-Oil Price Tables

Tables showing current crude-oil prices throughout the United States may be found in this issue beginning on page 194.

The figures, showing gravity schedules and flat prices for all areas, reflect the changes effected as a result of Phillips Petroleum Co.'s initial 25-cent advance posted June 15.

Although there was no increase in California crude-oil prices at that time, representative gravity schedules and current figures for selected crudes are published on page 196. These show changes resulting from the California price adjustment of February 16.

never operated at capacity. Due to the over-all demand for steel in all forms, sufficient ingots have never been available for these mills. In 1952, we had the additional complication of the long steel strike. In that year these mills operated at only 67 per cent. This year —based on uninterrupted operations— there will be 30 per cent more oil-country tubular goods and line pipe available.

"We should produce 2,300,000 tons of oil-country goods in 1953, as compared with 1,600,000 tons in 1952, and you should get 3,600,000 tons of line pipe as against 2,950,000 tons last year. In total, of all tubular steel products, we anticipate production of 10,200,000 tons this year as against 8,600,000 tons in 1952."

Outlook, by types . . . Even with foreign buying eliminated, Wallace said, there should be enough pipe produced to enable the oil industry to drill about 46,000 wells this year, about the same number as last year. As to the different types, he explained:

"Four sizable new pipe mills with integrated steel capacity behind them are going into production this year. The steel plate situation is so very tight that apparently large plate pipe mills will be able to operate at only about half capacity in the third quarter. There should be more plate available for such pipe in the fourth quarter and later.

"Buttweld pipe gives evidence of reaching a balance between supply and demand. There will not be enough seamless pipe, particularly in intermediate size ranges, to go around this year. Atomic energy and military requirements are continuing to take such a high proportion of seamless pressure and mechanical tubing that these products can hardly be in free supply this year.

"On the other hand, welded mechanical and pressure tubing seem to be more readily available. We are approaching a better balance—a period when, if your industry has normal forward planning and you provide adequate lead time, you may build your refineries and pipe lines and drill your wells when you want to."

Effects of price . . . The problem of getting the desired size, weight, and grade of tubular products is also being eliminated, Wallace assured the oil-company buyers. Government directives to obtain maximum tonnage, and the shortage of ingots which limited flexibility of mill operations both worked to keep down production of the most wanted sizes of tubular goods, he explained, and so did the fixed price schedule.

"With government production directives, except for direct military and atomic energy requirements, ending on June 30, and with supply and demand at last approaching a balance, I predict that beginning about the fourth quarter you will find it possible to buy your tons of steel in the sizes you desire," Wallace said, and added:

"Our recent revision in tubular prices has done much to correct the improper cost-price relationship which previously existed for small sizes, lighter wall thicknesses, and special finishing operations. The result of this price structure revision is a broader degree of satisfactory product acceptability to the mill, product by product and size by size."

Two Units Started

Vast petrochem center begins processing gas

TUSCOLA, Ill.—Hydrocarbon extraction and fractionation units have started processing natural gas at National Petro-Chemicals Corp.'s huge $44,000,000 center now under construction here.

The two units constitute the largest facilities in the world for recovery of hydrocarbons from natural gas and are the first to go on stream at the project.

At full capacity the hydrocarbon extraction unit will process 400,000,000 cu. ft. of gas daily from Panhandle Eastern Pipe Line Co., which owns 40 per cent interest in the petrochemicals firm, into liquid hydrocarbons. The fractionation unit will separate the liquid hydrocarbons into 450,000 gal. daily of butane, propane, isobutane, and natural gasoline. Additionally, 10,000,000 cu. ft. per day of ethane will be recovered from the gas for conversion into ethylene. All of these liquids will be distributed by Phillips Petroleum Co.

The project also includes construction of four chemical plants, water-treating and power plants, and necessary storage and loading facilities. The chemical plants will produce ethylene, alcohol, ethyl chloride, and sulfuric acid.

In addition, National Distillers Products Corp., which holds the remaining 60 per cent of National Petro-Chemicals, is planning to build a $7,000,000 ammonia plant on the site. Completion of the proposed plant is anticipated in early 1955 when National Petro-Chemicals' project is finished.

Offshore Barge Ordered

NEW ORLEANS.—The first floating drilling unit to be built for offshore operations within the past year or more has been ordered by The California Co. for use off the Gulf Coast.

Contract has been let to Alabama Drydock & Shipbuilding Co. for 140-ft. submersible barge with a 60-ft. beam. The drilling deck will be 43 ft. above the barge bottom, permitting operation in exposed locations as deep as 25 ft. The unit was designed by Friede & Goldman, New Orleans, working with California Co. engineers.

A new feature will be a hydraulically operated system for stabilizing the barge during lowering and raising.

Industry Briefs

HOUSTON.—Mar-Tex Oil & Gas Co. and Devon Leduc Oils, Ltd., have purchased about 1,500 acres in the Tamina pool 4 miles southwest of Conroe field, Montgomery County, Texas, from M. T. Halbouty. Purchase price was not disclosed. Tamina pool, opened late in the spring at Sinclair Oil & Gas Co. 1 Bender, recently was extended 1¼ miles by H. L. Hunt at its 2 Fitch.

WICHITA. — Herndon Drilling Co. has purchased seven wells in Harvey field of Cowley County, Kansas, from Smitherman & Cohen Drilling Co., El Dorado, Kans., for a price reported at about $500,000. Transfer of the property was made retroactive to June 1. The wells are located about 3 miles northwest of Arkansas City. Prorated production is about 170 bbl. of oil daily, and reserves under the approximate 70 acres are estimated at from 400,000 to 500,000 bbl.

TORONTO.—Imperial Oil has purchased a site on St. Clair Avenue west of Yonge and will erect a 19-story executive office building at a cost of $8,000,000. Construction will commence as soon as arrangements can be made.

DALLAS. — Republic Natural Gas Co. has sold its gas-gathering system in the Hugoton field area of Kansas to Northern Natural Gas Co., Omaha, for $3,415,839.

LOS ANGELES.—Union Oil Co. of California is planning to build a $5,000,000 marine oil terminus at Rodeo, Contra Costa County, California, to be connected with the company's Oleum refinery by a system of 31 pipe lines. The contractor, Ben C. Gerwick, Inc., of San Francisco, is scheduled to begin construction of the terminus within 2 weeks. Completion is anticipated in 10 to 12 months.

Price Hike Defended

Increase justified in relation to costs and an incentive for exploration to meet future oil needs, committee told

WASHINGTON.—Last month's crude-price increase was defended vigorously by oil-company representatives last week in hearings before the House Commerce Committee.

The companies contended that the crude and following products-price hikes were "long overdue" and only a fraction of what it would take to cover the increased costs which the industry has accumulated in recent years.

Appearing before the committee were representatives of five large oil companies, W. W. Keeler, vice president of Phillips Petroleum Co.; T. S. Petersen, president of Standard Oil Co. of California; Herbert Willetts, vice president of Socony-Vacuum Oil Co., Inc.; H. G. Burks, Jr., executive vice president of Esso Standard Oil Co., and Hines H. Baker, president of the Humble Oil & Refining Co.

One company official estimated the increase would cost the public $500,000,000 to $600,000,000 a year—if maintained that long—but a committee member charged it would amount to $353,500,000 over a 6-month period.

The officials told the committee the price increases were designed (1) as an incentive to increased exploration and development to secure oil that will be needed 5 to 10 years hence, and (2) to recoup some of the increase in the costs of labor, materials, transportation, etc.

The opposition . . . Members of the committee from consuming states, however, declared the companies' arguments were weak and contended there was nothing in the immediate economic situation to justify the increases.

They charged that company profits have increased 200 to 1,000 per cent in the past 10 years despite the fact that in the last half of the period costs rose while prices did not.

They alleged that by reason of the depletion allowance and the expensing of drilling costs the companies have been able to avoid the payment of excess-profits taxes.

They refused to give weight to the argument that the oil being produced today is in large part oil that was discovered in an era of lower costs.

They asserted that high inventories and recent cutbacks in production demonstrated there was no necessity for higher prices.

They rejected entirely the idea that the consumer should be charged a higher price today to pay for future supplies.

Committee Chairman Charles A. Wolverton of New Jersey declared the 27½ per cent depletion allowance should be adequate as an incentive for exploration and intimated he might seek to have it "pinned down" for that purpose when revenue revision comes up for consideration next year.

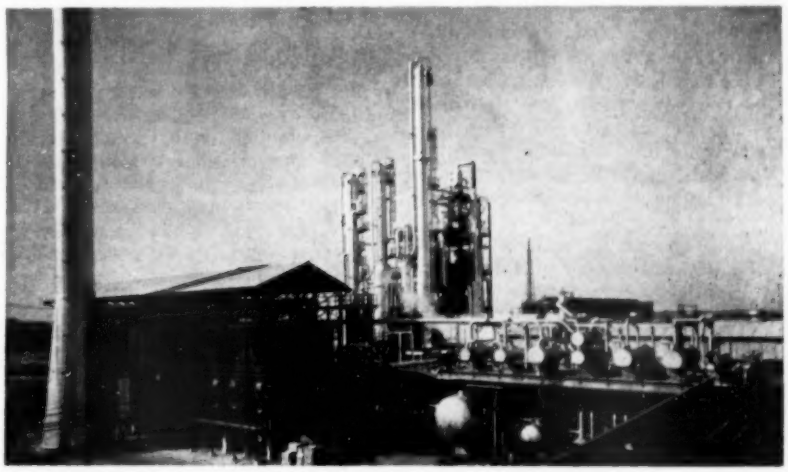
Rep. John W. Heselton of Massachusetts raised the threat of federal control of the industry, introducing a bill to create a National Petroleum Commission with authority to "prescribe such prohibitions and requirements with respect to the production, refining, distribution, and sale of petroleum and petroleum products (including natural gas) as it deems necessary for the protection of the national security and economy."

The committee was particularly interested in the earnings history of the companies. Each witness was questioned regarding the gross and net profits and increases in net worth over the past decade. Little importance appeared to be given protests that, while over-all profits were up—on paper—the companies' financial position was not correspondingly improved. The higher profits, the committee was told, were due to increased volume of business and to efficiencies which minimized some of the cost increases. Profits per unit of sales actually were lower in 1952 than in 1943.

Incentive a must . . . Crude prices were increased as an incentive to expanded exploration, Keeler explained. Although drilling is fully as great now as it was last year, it is discoveries rather than wells drilled that tell the story and new reserves are not being found at as high a rate as necessary to provide the supply the Paley Commission estimated last year will be necessary to meet demand in 1975.

Keeler asserted that the total cost of discovering, developing, and producing oil has increased 50 per cent since December 1947. It would take an increase of $1.25 to recover all that increase, he pointed out, but he said Phillips does not contemplate another increase, at least until the company sees what develops out of the present price situation.

"In order to promote the necessary exploration and drilling to provide additional reserves and to assure the continued production of existing wells to exhaustion, the price of crude must be maintained at a level sufficient to pro-



Gulf Considering New Petrochemical Facilities

Gulf Oil Corp. has revealed that it is considering constructing another ethylene plant, an ethylene oxide plant, and an ethylene glycol plant to operate in conjunction with its new ethylene facilities (shown above) at Port Arthur, Tex. The plant, pictured here, was Gulf's first venture into the petrochemical field and now is producing at the rate of 2½ billion cubic feet of ethylene annually. Its entire output is being delivered to five Gulf Coast chemical plants.

WATCHING WASHINGTON

Bertram F. Linz

Why Such a Hubbub?

Costs of food, clothing, shelter and everything else have been going up steadily for the past several years and nobody seemed to think much about it, but when crude oil prices were increased for the first time in some 6 years and product prices were adjusted accordingly there was an immediate cry for federal control of the oil industry.

The new agitation for government regulation was touched off July 1 at the opening of hearings by the House commerce committee, by a member of the Michigan Legislature. Rep. John W. Heselton of Massachusetts grabbed the ball and carried it to a touchdown with introduction of a bill in Congress to establish an 11-member national petroleum commission which apparently could control every activity of the industry.

Heselton's commission would have the authority to regulate the production, refining, distribution and sale of crude, oil products, and natural gas to the extent deemed necessary for the protection of the national security and economy.

This authority apparently would extend to the power to impose price controls. And it probably also would set up a serious conflict with the state regulatory bodies, of whose proration actions Heselton has been highly critical.

There is no chance of enactment of the bill this year, and possibly the explanation of recent price changes by company officials may show they were not "unwarranted," as Heselton charged, and nothing more will be heard of it. But it demonstrates that despite the recent change in the political complexion of the Government, there are still many who think the way to solve all problems is to turn them over to the national Government.

Boon to Indians

Indians in Montana's Fork Peck reservation are making a good thing out of the oil activity in the Williston basin, and the Interior Department is seeing that they get all that is coming to them.

Specifically, the department is supervising the sale of oil leases instead of permitting the Indians to negotiate for themselves.

In one case, Indian heirs owning a two-thirds interest in a 40-acre tract were offered $26.50 an acre bonus for a lease. The Indian Bureau sold the lease on competitive bids and secured $822.56 an acre bonus. In other instances, competitive bids brought 2 to 5 times as much bonus as had been offered by lease-buyers attempting to negotiate directly with Indians.

While it is the objective of the department to terminate its responsibility for administering the affairs of individual Indian tribes as rapidly as possible, Secretary Douglas McKay has made it clear that so long as it continues to have those responsibilities it will discharge them in the best interest of the Indians.

To that end, he indicated, the department will scrutinize closely all requests from Indians for fee patents and for negotiated oil and gas leases on the Fort Peck reservation.

Still in the Picture

The Navy Department has suspended its exploration activities in Alaska but hasn't entirely abandoned the idea of developing oil reserves in Naval Petroleum Reserve No. 4.

The department would like to have the exploratory work picked up by the oil industry. As an incentive, it proposes to leave its oilfield equipment and supplies in storage at Point Barrow, where they could be acquired by any company wanting to work in the area.

Officials testifying before the House appropriations subcommittee on the matter didn't seem certain whether the department was out of the exploratory field permanently. They first said the work will not be resumed, but later a Navy witness said it might be taken up again after a lapse of a few years, in the event no company evinced any interest.

In an 8-year effort to find oil in the reserve, the Navy expended approximately $45,000,000 on an exploration program which brought no commercially-exploitable discoveries. Navy Secretary Robert B. Anderson announced last March that the effort would be discontinued and the camps in Alaska are now being closed down.

vide the necessary incentive," Keeler insisted.

"The adequacy of the supply of crude reserves for the future is dependent upon increased exploration and the drilling of wells at an ever-increasing rate. Such a rate of exploration and drilling will not be accomplished unless the productive branch of the industry has the expectation of prices sufficient to attract risk capital. The rate of exploration and drilling at present and in the immediate past has not been sufficient. Despite a drilling rate of record proportions, the net increase in the crude-oil reserves during 1952 was the lowest of any of the past 8 years."

Keeler also explained that the stocks which some committee members felt were high actually were not. Of the 280,000,000 bbl. of crude inventories, he said, approximately 180,000,000 bbl. is for pipe-line fill and similar purposes and unavailable for sale. The usable crude stocks of 100,000,000 represent only 14 days' supply at the current rate of consumption. Similarly, product stocks indicate only 29 days' usable supply.

Keeler pointed out that the Government has urged the industry to increase its capacity to at least 1,000,000 bbl. per day in excess of current demand and that almost that much has now been developed but emphasized that reserve capacity is not excess capacity and should not be considered in determining the need for incentive for further discoveries.

Informed in advance . . . Members of Congress, including some on the committee, were informed in advance of the price increases announced last February by Standard Oil Co. of California, Petersen disclosed. They were made, he said, to correct "unrealistically low" ceiling prices which the Office of Price Stabilization had repeatedly refused to adjust and which had resulted in severe shortages of both crude and products on the West Coast.

The price increases announced since OPS control was lifted have provided the necessary incentive for increased activity and West Coast demand for products is now generally being met, Petersen said. There are a few exceptions, he admitted, the most significant being military requirements for aviation gasoline which is entirely a problem of refining capacity and not of price.

Earlier try failed . . . An attempt by Socony-Vacuum to increase product prices last February failed because other companies did not follow suit, Willetts explained. He said the same factors which prompted that increase still existed when prices were again increased last month, plus the fact that in the meantime refinery prices on the

Gulf Coast had risen one-fourth cent per gallon.

Willetts said his company builds its price structure on the prices which refiners quote for large volume sales in the open market which is the predominant source of supply for the area to be served, plus transportation, secondary transportation, marketing expenses, and a reasonable return on marketing investment.

The resulting prices are those the company believes are fair and it should receive for its products, but competition does not always permit their realization, he said.

There were two increases in product prices on the East Coast in June. The first was initiated by Socony-Vacuum on the basis of its own evaluation of costs, while the second was due to the increase in crude prices.

Under sharp questioning by committee members, Willetts denied his company had any hand in the fixing of retail prices. Sales are made to jobbers and dealers, who fix their own margins, and the company itself operates only about 50 service stations, primarily for research on station equipment and selling methods.

"There are always some who will urge that suppliers such as Socony-Vacuum should absorb the burden of crude and other cost increases, and in the temporary interest hold prices down regardless of sound business principles," he told the committee. "We have long followed a policy of trying to make each of our principal activities pay its own way. This is both sound business and good public policy. Since we are large buyers of domestic crude oil and not sellers, on balance, we are not in a favorable position to subsidize refining and marketing operations out of crude-oil producing profits even if we were inclined to do so."

Decline in earnings . . . Since its last general increase in gasoline prices in July 1950, Esso Standard earnings per dollar of sales have declined from 4 cents to 3 cents, Burks testified. During the same period costs of doing business have increased substantially, despite efforts to reduce them and improve efficiency. Price increases were necessary if the company were to maintain a sound financial picture.

Burks disclosed that the price increases announced by Socony-Vacuum before Esso had reached a decision were somewhat less than his company contemplated, but it adopted the same increases "since we could not expect our customers to pay a price higher than the price at which they could purchase similar products from a substantial competitor." The increase in crude prices a few days later presented a new problem and necessitated a second increase in gasoline prices.

"I think it is worth pointing out that even at the new price levels gasoline prices have not risen unreasonably in comparison with many other commodities in common use," Burks commented.

"Prices play a very important part, as I see it, in our economic system. Prices can be too low as well as too high, from the long-term consumer standpoint. The record of the petroleum industry is that prices have over the long term been reasonable as compared to any other important commodity. At the same time, they have made it possible for the industry to meet the rapidly mounting needs of customers with constantly better products and to build and maintain an important bulwark to our national defense."

Nothing abnormal . . . The increased prices reflect the operation of normal market factors of supply and demand influenced more particularly in this instance by the long-range effects of continually increasing costs since the last general increase in December 1947, Baker stated in answer to the questions asked by Wolverton at the opening of hearings July 1.

The economics of the industry has justified price increases over a considerable period of time. It is not the level of supply alone which affects price, but the relation between supply and demand. The relation between increasing demand and supply and the effect of increasing costs accumulating over a period of years means that price must increase if supply is to continue to keep pace with increasing demands, he said.

Baker denied that there has been any policy in the industry of discouraging the use of oil for fuel. He denied also that the Texas Railroad Commission allowables have been set in such a way as to restrict supply below demand but challenged a statement that Texas production still exceeds demand by 400,000 bbl. daily.

Simpson Bill Reported

WASHINGTON.—The Simpson bill, providing for import restrictions on oil was sent to the House floor last week by the Ways and Means Committee but is not expected to be acted upon before Congress adjourns, around August 1.

The measure includes the provisions for oil quotas and restrictions on the authority of the President to ignore Tariff Commission recommendations on import rates which Rep. Richard M. Simpson tried unsuccessfully to have incorporated in the legislation extending the Reciprocal Trade Agreements Act for another year.

The committee also finally reported the bill to continue the excess-profits tax for 6 months after June 30 after Chairman Daniel A. Reed of New York had kept it bottled up for weeks in an attempt to terminate it and reduce individual income taxes on the same date.

The Simpson bill provides that imports of residual oil shall be limited to 5 per cent of domestic demand for the corresponding quarter of the previous calendar year.

Oil Law Contested

Arkansas takes tidelands quitclaim to federal court

WASHINGTON. — Constitutionality of the recently enacted tidelands "quitclaim" law turning back to the coastal states the submerged lands within their historic borders was challenged in federal court last week by the State of Arkansas.

A suit to declare the law null and void and to restrain federal officials from turning back to California, Texas, and Louisiana an estimated $50,000,000 of royalty and other payments, which have been held in escrow, was filed by Arkansas Atty. Gen. Tom Gentry.

Arkansas was one of several states which threatened when the measure was under consideration in Congress that they would fight the law in the courts. It was not clear whether other states will file individual suits, but attorneys general from some 15 or more states met July 10 to discuss plans to support the suit brought by Gentry.

During debate on the tidelands bill in the Senate, opponents of state ownership warned they would fight the measure all the way to the Supreme Court and pointed out that such litigation could be kept alive for as long as 5 years or more.

Imports Situation Unchanged

WASHINGTON.—The imports problem has not been alleviated and the last hope of domestic producers for relief against excessive oil imports, other than through Congress, "now seems foreclosed," Russell B. Brown, general counsel of the Independent Petroleum Association of America, said last week.

"The President is reported to have requested the Tariff Commission to take no further action on escape clause

relief until after the special commission on foreign trade has reported," Brown said in a report to IPAA President Charlton H. Lyons.

As "other straws in the wind," Brown pointed out that Dr. Milton Eisenhower, brother of the President, is heading a trade mission to South America where he reportedly said that the United States "opposes all restrictions on free trade, especially an increase in duties on imports of Venezuelan oil." The bill to extend the trade agreements program is now in conference, and the Simpson bill, containing provision for oil quotas, is held up by the controversy over the excess-profits tax and has little chance of enactment this year.

Tax Bill Proposed

Plan would amortize all new facilities in 5 years

WASHINGTON.—Legislation to permit the amortization over a period of 60 months of all industrial facilities built or acquired after December 31, 1953, has been introduced in Congress by Sen. Homer E. Capehart of Indiana.

The bill is limited to facilities constructed or acquired after this year in order to meet objections of the Treasury Department which, while favoring the speeding up of amortization, is opposed to any change affecting existing facilities. This is due to heavy losses in immediate taxes resulting from the heavy writeoff of facilities now being amortized over a period of 20 or more years.

A 5-year writeoff has been granted since October 1950 for $16,566,000,000 of $27,309,000,000 invested in 17,426 new or expanded facilities under the accelerated tax amortization program. The idea of extending the shorter period to all facilities has been explored by the Treasury Department, which is planning to make tax recommendations to Congress next year.

Capehart explained his bill would give industry greater incentive to expand and would be a "weapon" to defeat inflation and forestall depression. He expressed the belief enactment of the measure would stimulate industry to invest $10 billion in 2 years to increase production.

PAD Drops Export Reports

WASHINGTON.—The Petroleum Administration for Defense had discontinued its weekly reports on exports of major oil products.

The reports were discontinued, it was explained, because practically complete recovery from the effects of the Iranian shutdown of June 1951 has made the PAD figures, which were more nearly current than any others available, less significant for industry operations. Also, reductions in the PAD staff make it difficult to continue compilation and publication of the figures.

NPA Gets Some PAD Duties

WASHINGTON.—All mobilization responsibilities for production and distribution of oil-field machinery and equipment formerly exercised by the Petroleum Administration for Defense have been relinquished to the National Production Authority.

Under an agreement between the two agencies in January 1951, PAD was named as the agency through which the material needs of the oil and gas industry would be handled during the Korean emergency.

With the end of the Controlled Materials Plan June 30, there is little likelihood now seen of any need for controls over either the production or distribution of machinery and equipment. However, in relinquishing its authority PAD specified that in the event of any future mobilization crisis the controls would be redelegated to it, or to such successor agency as might be charged with petroleum responsibilities.

PAD Approval Required

WASHINGTON.—Oil and gas operators requiring nickel-bearing stainless steel were advised last week by Deputy Petroleum Administrator J. A. LaFortune that they must file their purchase orders for approval by the Petroleum Administration for Defense if they desire priorities assistance.

If an operator can secure steel without priorities assistance he need not file with PAD, but self-certification of priorities orders is not permitted.

Nickel-bearing stainless steel has been retained under allocation by the National Production Authority for the third quarter. No provision has been made for fourth-quarter allocation, however, and the present plan is to lift the control September 30.

SOUTHWEST

New Area Opened

Chaves County test, north of all existing production in southeastern New Mexico, flowing 12 to 15 bbl. per hour

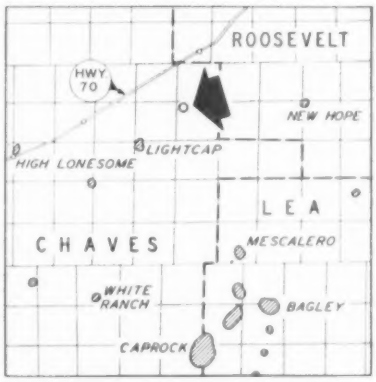
Carl Hoot

HOBBS, N. M.—A new oil pool was in the making this week in a relatively new geological province, north of all production in southeastern New Mexico.

Extensive exploration this year has opened several fields away from established trends, and the new prospect, which has already shown for flowing production, will open an additional large and untried area for further drilling.

The new wildcat, shown by arrow on the accompanying map, is Forest Oil Corp. 1 Federal-General American in 7-7s-31e, 8 miles southwest of the town of Kenna, on Highway 70.

The drill-stem test which had flowing oil was from 7,754-7,888 ft. Gas reached the surface in 7 minutes, mud in 27, and oil in 32 minutes. It flowed into pits at an estimated rate of 12 to 15 bbl. hourly. Fluid in the pipe was all oil, with no water. Gravity was 45.2°. Following the test, laboratory analysis of cores taken from the section identified it as being Pennsylvanian in age.



A drill-stem test from 7,903-8,017 ft. returned 30 ft. of mud with no shows, but another at 8,370-8,456 ft. a good blow of gas developed. Recovery was 600 ft. of heavily gas-cut mud. The last test to be reported was from 8,605-50 ft., which in 1 hour developed 200 ft. of slightly gas-cut mud. Operators have tentatively identi-

fied the last interval as being in the Mississippian. The well is now drilling ahead.

Why it is important . . . Importance of the well lies in its location, which is geologically known as a pre-Permian intermediate area. Surface and subsurface studies of Chaves County have indicated good conditions for considerable reservoir zones, beginning with the Wolfcamp or Permo-Pennsylvanian and extending to the pre-Cambrian, and at economic depths. *(See Petroleum Possibilities of Chaves and Eddy counties, New Mexico, by Phil D. Helmig. The Oil and Gas Journal, October 20, 1952.)*

The depth to the Wolfcamp in Chaves County ranges from about 3,500 ft. on the flanks of the shelf-shore area on the north to about 7,000 ft. in the southern part of the county.

Fields nearby the new discovery, Lightcap to southwest and New Hope to the east, are geologically located near shore, or in the shelf-shore phase. They have produced high-gravity oil and distillate.

These accumulations also are thought to indicate small local petroleum source beds, or the tail-end of long-range migration into shoreline porosity pinchouts or structural traps. Accordingly, areas favorable to larger accumulations would be toward the deeper water or basinward from the shoreline, and in the intermediate zone, such as is indicated by Forest Oil Corp's well.

Nearest production . . . New Hope, a one-well pool, is the nearest similar production to the discovery. The pool is about 18 miles to the east in 6-7s-34e. The discovery was Magnolia Petroleum Co. 1 Brown, drilled in 1951. It was completed in sandy conglomerate of Pennsylvanian age for a flowing potential of 175 bbl. of oil a day through ¼-in. choke.

Formation markers in this well, on elevation of 4,347 ft., were: Perma-Pennsylvanian 7,525 ft. (top of pay was 8,131 ft.); Mississippian 8,204 ft., Devonian 8,570 ft., Ellenburger 8,945 ft., and pre-Cambrian granite 9,040 ft. Total depth was 9,067 ft. Development of the pool was said to have been prevented by litigation.

Right down the intermediate area fairway, in line with the Forest discovery, lies Republic Natural Gas Co. and Seaboard Oil Corp. 1 White Ranch field. This well was completed as a good flowing well earlier this year in the Siluro-Devonian at 8,719-79 ft., and development work around the discovery had added a new pay in the Wolfcamp and prospects of production in the Pennsylvanian.

ROCKY MOUNTAIN

BOTTOM LANDS of the Missouri River which will be flooded on completion of Garrison dam are indicated on wall map by Ralph M. Shane, acting superintendent of the Fort Berthold Indian agency. Riverdale, N. D., site of the big dam, is at extreme right.

Threat to Production

Big Garrison reservoir expected to flood possible 3,840 Nesson anticline acres, including recent Amerada strike

Joseph A. Kornfeld

TIOGA, N. D.—The first oil well to be completed in an area which will be flooded by the new Garrison reservoir was placed on production last week 19 miles south of here by Amerada Petroleum Corp.

Construction of the $200,000,000 Garrison irrigation dam spanning the Missouri River at Riverdale, N. D., will back up water for a distance of 200 miles across the western part of the state.

Amerada engineers estimate from 4 to 6 sq. miles, or from 2,560 to 3,840 acres, of oil leases on the Nesson anticline straddle the headwaters of the reservoir. If all of this area proves productive, this would call for the drilling of from 64 to 96 wells on 40-acre spacing to the 8,500-ft. Madison limestone, the principal reservoir on the anticline.

Last week, Amerada field crews arranged to truck out first oil from the new well—the 1 Yttredahl, C SW NE 33-154n-95w, in northern McKenzie County. Initial flow rate was 173 bbl. of oil per day from acidized Madison limestone from 8,246-8,300 ft. The discovery lies 2½ miles north of Charlson field, McKenzie County, and 3½ miles south of Hofflund field, Williams County, both of which produce from the Madison.

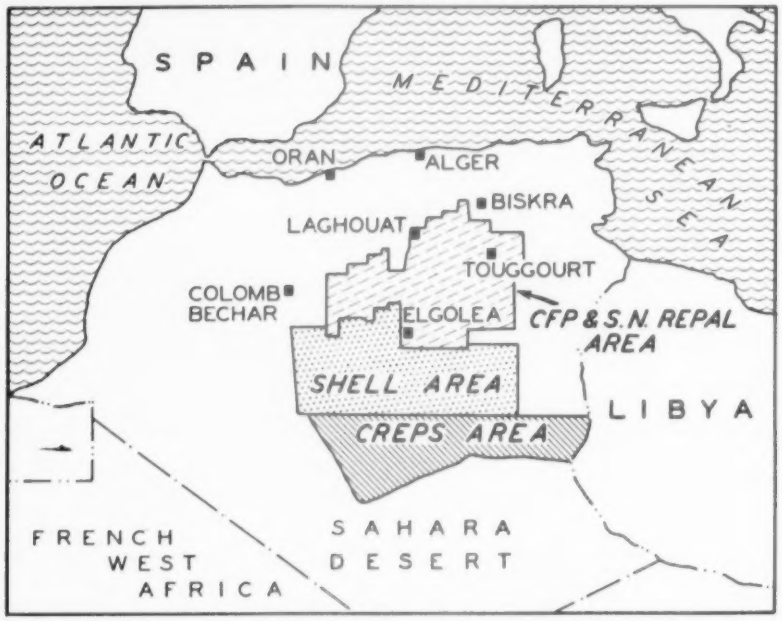
Development of the tracts intersecting the Garrison reservoir was stepped up last week when Amerada commenced construction of the first drilling mound to be built in the Missouri River bottomlands. Located 3½ miles due west of the 1 Yttredahl discovery well, it will be used to drill the company's North Dakota fee, Tract 4, Well No. 1, in C NE SW 36-154n-96w.

Drilling mounds . . . Earthen drilling mounds, similar to those currently employed in providing drilling foundations in the Colorado River basin area of West Texas, will be built by Amerada *(The Oil and Gas Journal, January 5, page 69.)* The mounds are rectangular with a crest measuring 112 by 150 ft.

Mound height will be sufficient to clear the 1,850-ft. level recommended by Gov. Norman Brunsdale and the North Dakota Water Conservation Commission.

Jackknife rotary rigs with auxiliary equipment and pipe racks will be arranged so that all drilling operations can be performed from the top of the mound. After completion of the well, the mound would be truncated to a height sufficient to elevate the well head above the proposed water line of the reservoir. Riprap will be installed to prevent erosion by water.

After each well is completed on its mound, water-borne barges will transport crude from the well during the summer. Cruisers will be used to move switchers to maintain the well. During the winter, tank trucks will be driven across the frozen surface of the reservoir to pick up the oil.



AFRICA

Sahara Search Pushed

Three groups now carrying out exploratory operations in area comprising about 270,000 acres in southern Algeria

Dahl M. Duff

THE Sahara desert of southern Algeria is receiving major emphasis in the current phase of the government-sponsored search for oil in territories of the French Union.

Several French companies, in one of which Shell holds controlling interest, are now carrying out exploratory operations over large areas lying generally south of the Atlas Mountains. Much of the work is still in the preliminary stages of geological investigation.

Three concessions . . . In the northern part of the area, however, two companies, S. N. Repal, and Cie. Francaise des Petroles, have been doing geological studies for several years. These companies have received permission to work in an area of 232,000 sq. km., or nearly 90,000 sq. miles, bounded roughly by Biskra on the north, El Golea on the south, Figuig on the west, and the Tunisian border on the east.

S. N. Repal, which is controlled by the French and Algerian governments, is reported to have two wells under way, one near Colomb Bechar and the other north of El Golea. C. F. P., the other company involved in this region, is a major French oil company, holding the 23.75 per cent French share in Iraq Petroleum Co., Ltd., and controlling the refining company, Francaise de Cie. Raffinage.

South of the S. N. Repal-C. F. P. area is a section of Sahara territory totaling 240,000 sq. km., or about 93,000 sq. miles, and held by Cie. des Petroles d'Algeria. C.P.D.A. is owned 65 per cent by Royal Dutch-Shell and 35 per cent by French interests. The area lies generally between the Grand Erg Occidental and the Grand Erg Oriental.

Still farther to the south is a third exploration area where rights are held by Cie. de Recherches et d'Exploitation de Petrole au Sahara (C.R.E.P.S.) Topographical field work in this area is still in an early stage. The operating company is owned by S. N. Repal and other oil companies.

Big government effort . . . The postwar search for oil in the French Union, both metropolitan France and the overseas territory, has been called the greatest state-sponsored oil-exploration effort ever carried out. The expenditure is currently running at about $65,000,000 a year.

During 1953, French experts estimate that the portion of these funds spent in North Africa will exceed the amount used in France itself. The North African outlay is directed toward development of production in the Algerian coastal area, in French Morocco, and Tunisia, as well as in the exploratory work in the Sahara.

EUROPE

Private Firms Active

Oil search concentrated in central and southern Italy

ALTHOUGH the Italian Government has reserved the Po Valley for state-conducted operations, much of the oil and gas exploration in central and southern Italy and in Sicily is being carried out by privately owned companies.

According to a recent official Italian statement, 61 per cent of the exploration permits issued in these areas has been to private companies, and 95 per cent of these is represented by permits given in the last 30 years.

Recent exploratory developments in central and southern Italy include a gas well drilled by the Terni Co. of Rome in the Fogliano Lake district. The hole reached a depth of about 1,400 ft. In the Valle Latina, Province of Frosinone, the Bombrini Parodi Delfino Co. has completed a gravity-meter survey of acreage covered by its exploration license.

Soc. Idrocarburi Nazionali of Florence has completed seismic work in the coastal zone between the Pescara and the Moro rivers in the Abruzzo region, while Soc. di Richerche Petrolifere Meridionali has started exploration of its territory on the Adriatic Coast between the Pescara and the Vomano River. S. A. Meridionale del Metano has resumed exploration in the Rivisondoli and the Pescosolido districts.

A well testing about 105,000 cu. ft. of gas daily was completed by Soc. Mineraria Nazionale in the Rionero Sannitico area. The well, however, is not yet being produced on a commercial basis. In the Garigliano, Volturno, and Sele vallies and around Avellino, S. A. Meridionale del Metano has completed preliminary work and is now

planning to start drilling. In Calabria, the Montecatini company of Milan has completed two wells, one dry at a depth of about 8,700 ft. in the Scandale district (Crotone), and the other in the Cimiti Cape district which was reported to have disclosed a gas structure of considerable importance.

In Sicily, exploration permits have been issued covering a total of about 3,460,000 acres. The Sicilian regional government, however, has reserved about 1,800,000 acres of territory for its own exploratory operations.

Refinery Nears Completion

Esso Standard Refinery, S. A., an affiliate of Standard Oil Co. (N. J.), will officially open its new 27,000-bbl. per day Antwerp refinery on September 8.

The Belgian refinery incorporates Standard Oil Development Co.'s new Model IV fluid catalytic cracking, with the latest design in SO_2 treating and will have other unique features of combination processing.

Charging Middle East crude, it will produce gasoline, kerosine, diesel fuels, and light and heavy fuel oils. A combination unit, the heart of the new refinery, will incorporate crude distillation, catalytic cracking, thermal reforming, and fractionation and absorption of light ends. Lummus Co. is building the new refinery.

A.S.E.G. Affiliation Voted

An affiliation between the European Association of Exploration Geophysicists and the American Society of Exploration Geophysicists was arranged at the recent fourth meeting of the European organization in Paris.

The Paris meeting was attended by 150 persons who heard presentation of 22 technical papers. Two committees were set up, one on safety and the other on tidal curves.

Dr. D. T. Germain-Jones, with Anglo-Iranian Oil Co., Ltd., in the company's London office, was elected president of the E.A.E.G.

The new council elected at the Paris meeting includes representatives of Britain, France, Holland, Italy, Germany, and Sweden. Dr. T. C. Richards, senior geophysicist at Anglo-Iranian's research station at Kirklington Hall in England, was appointed the association's official representative in Great Britain.

Meeting arrangements were made by Cie. Generale de Geophysique and Soc. de Prospection Electrique.

MIDDLE EAST

AMERICAN INDEPENDENT personnel examine oil from the Wafra 4 during production tests in the first photograph released by the company since the discovery in March. The well is now shut in, awaiting further development of the field and plans for shipment of the oil.

Third Neutral Zone Well Near Start

THE American Independent Oil Co. expects to spud in its third well on the Wafra structure in the Neutral Zone within a week. Location of this well has not yet been announced.

Late last week the company was drilling into the Zubair formation in its Wafra 5 to test that zone which is productive in Iraq's Zubair field. If no oil is found in the Zubair, which lies at about 5,000 ft. in the Wafra area, the company plans to complete the well in the Burgan sand, which it topped at 3,620 ft. *(The Oil and Gas Journal, June 29, page 56.)*

Announcement of completion of the Wafra 5 is expected early this week. It is the second American Independent well to find oil and confirms the field discovery, Wafra 4, which found the Burgan sands productive in March. The Wafra 5 is about 2¼ miles from the Wafra 4 and was spudded in April 26.

The discovery well, which flowed at rates as high as 4,000 bbl. daily, was the sixth wildcat drilled by Aminoil in a $30,000,000 exploration program which began in 1949.

Exploration Pact Signed

Kerr-McGee Oil Industries, Inc., has signed a contract to carry on exploratory operations for Lapidot Co. on the latter's concessions in Israel.

Terms of contract provide that the project will last at least a year. Kerr-McGee now is recruiting personnel.

Lapidot has purchased two rotary rigs, one a heavy-duty rig, and is scheduled to ship them late this month. The company already has shipped a cable-tool rig.

The company holds, or shares with other companies, rights on three separate concessions in Israel. It has exclusive rights on one small block in the extreme northwest part of the country near Haifa. A second concession is held jointly with Israel Oil Co. in the southwest part of the country. A third block of about 20,800 acres at the south end of the Dead Sea is held jointly with Israel Oil Prospecting and Jordan Exploration Co., Ltd.

Oil Conference Scheduled

An Iraq Government economic mission was scheduled to leave Baghdad recently by air for Saudi Arabia to discuss developments in the oil industry.

The Iraq group was headed by the minister of economics, Dr. Dhia Jaffar, and included Mohammed Alnaqib, director-general of oil affairs. After the meetings with Saudi Arabian officials, Mohammed Alnaqib was to go to Cairo to attend a session of the Petroleum Committee of the Arab League.

The Iraq and Saudi Arabian officials were expected to discuss oil production, prices, and Free-World markets. The two countries together currently produce more than 1,400,000 bbl. daily and, with Kuwait, are the most important factors in the Middle East oil industry. Fifty-fifty profit-sharing agreements are in effect in both countries, in Iraq with Iraq Petroleum Co., Ltd., and in Saudi Arabia with Arabian American Oil Co.

Kuwait Price Raised

Gulf posts 25-cent boost increasing price to $1.75

GULF EXPLORATION CO. last week boosted the price of Kuwait crude oil 25 cents a barrel, the first break in Middle East prices since the 25-cent general increase initiated in the United States June 15 by Phillips Petroleum Co.

The increase brought the price of 31° to 31.9°-gravity crude loaded at Mina-al-Ahmadi, Kuwait, from $1.50 to $1.75 a barrel. Gulf Exploration is a subsidiary of Gulf Oil Corp., which controls half of the production in Kuwait now running between 800,000 and 900,000 bbl. daily.

There were no increases announced by other Persian Gulf producing companies immediately.

It was pointed out that Kuwait crude was cut 15 cents a barrel the first of April *(The Oil and Gas Journal, April 6, page 75)*, and that this reduction was not followed by other Middle East producers. This reduction was announced by Anglo-Iranian Oil Co. and was based on the fact that Kuwait crude is less desirable than other Middle East crudes of similar gravity, partly because of its heavier fuel-oil yield. Previously it had conformed in price to the gravity schedules of other Middle East countries.

For this reason there was some speculation as to whether other producing companies would follow the 25-cent increase.

Venezuela is the country which would be most critically affected by a change in Persian Gulf prices. If no general raise were forthcoming, it would mean an even quicker loss of the country's remaining markets in Europe and would hold a threat of Middle East crude taking over more of the dollar markets in the Western Hemisphere.

FAR EAST

Stanvac Shares Snapped Up

Indian investors snapped up an opportunity to invest in the local refining subsidiary of Standard-Vacuum Oil Co.

An issue of about $8,000,000 in debentures in Standard-Vacuum Refining Co. of India was fully subscribed when it was placed on the market recently in Bombay.

Standard-Vacuum is now building a 25,000-bbl.-daily refinery near Bombay, which is scheduled to begin operations in July 1954. The company's original agreement with the Indian Government 2 years ago provided that 25 per cent of the capitalization in the local company would be offered, on a preferred-stock basis, to Indian nationals.

Plenty of Oil Claimed

The Chinese Communist Government announced in a recent broadcast over Peiping radio that there now is an "abundance" of petroleum in the country.

The broadcast gave no production total but said that present output of crude is 12 per cent higher than the highest prewar level. Gasoline and kerosine production, it was claimed, are up 231 and 687 per cent, respectively.

There was little excitement over the announcement, however, since China's entire production in 1944 came from approximately 20 wells in Kansu province. No total was revealed at the time due to the war with Japan.

Indian Tanker Fleet Urged

Indian shipowners are urging their government to take the initiative in acquiring a tanker fleet to serve the three refineries being built in the country.

The National Steamship Owners Association pointed out recently in Bombay that tankers will be required to bring in crude for the plants and also to carry products to consumers and distribution points along the coast.

Burmah-Shell and Standard-Vacuum have refineries under construction near Bombay and scheduled to go in operation in 1954 and 1955. Caltex is planning to begin work on a refinery on the east coast of India in the early part of 1955.

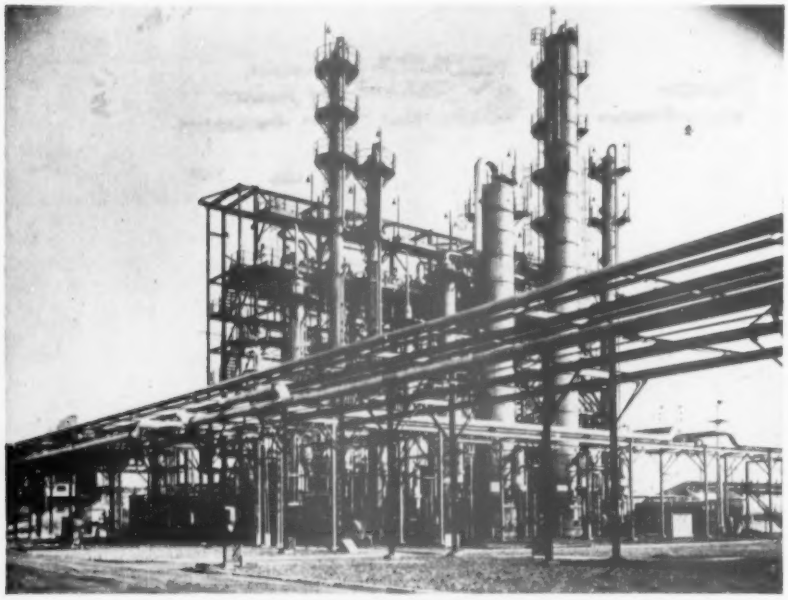
AUSTRALIA

Unit Foundations Poured

Foundations are now being poured for the two distillation units and other process equipment at the 60,000-bbl.-daily refinery under construction by Anglo-Iranian Oil Co., Ltd., on Cockburn Sound near Fremantle in Western Australia.

The period of intensive site preparation has been largely completed.

A few miles from the refinery site the Western Australian Government is constructing a 20,000,000-gal. reservoir to supply the plant and the housing development with water. About 3,000,000 gal. of fresh water daily will be used in the refinery and for domestic purposes, while about 2,500,000 gal. an hour will be drawn from the sea for cooling.



New Petrochem Plant Operating at Capacity

Latest operating addition to the petrochemical industry in the United Kingdom is this distillation unit of the styrene monomer plant of Forth Chemicals, Ltd., at Grangemouth, Scotland. The plant, which reached full capacity rate last month, is the first large-scale producer of styrene monomer in the U.K. The Forth Chemicals plant is located in the south side of the Forth estuary and obtains its basic raw materials, benzene and ethylene, from the adjoining plant of British Petroleum Chemicals, Ltd. (Anglo-Iranian and the Distillers Co., Ltd.). Forth Chemicals was organized by British Petroleum Chemicals and Monsanto Chemicals, Ltd.

Search Looking Up

U.B.O.T. reports three small strikes in Trinidad

SOMEWHAT more encouraging results in exploratory work in Trinidad have been reported by United British Oilfields of Trinidad, Ltd., a leading producer and refiner on the island.

In the Ortoire basin, an accumulation of oil has been found at Balata, but it is not yet known whether it is of sufficient size to justify commercial development. Small quantities of oil also have been obtained from two wells in Catshill.

In its report, U.B.O.T. commented that it had already spent £1,900,000 (about $5,300,000) in exploration surveys and test wells in the Ortoire basin and said that something very substantial in the way of oil reserves must be found before there is any solid prospect of the company recovering its investment.

Offshore tests . . . Trinidad Northern Areas, Ltd., in which U.B.O.T. holds a third interest, has made substantial progress in preparation for testing its extensive marine holdings in the Gulf of Paria. Location of the first offshore well to be drilled has been selected, and it is expected that the test will be started about mid-1954. U.B.O.T. will carry out all work on this marine development on behalf of Trinidad Northern Areas.

The importance of the oil industry to the economy of Trinidad is brought out in the U.B.O.T. report. Though the island's crude production in 1952 increased by less than 2 per cent over the preceding year, the industry's total disbursements in the colony of approximately £16,000,000 (about $45,000,000) were 16 per cent higher than in 1951. Of this sum, nearly £5,500,000 (about $15,500,000) represented the industry's direct contribution to the revenue of the colony, accounting for 36.4 per cent of the local government total.

International Briefs

Two newly completed pipe lines have made Duisburg in West Germany the major oil port on the Rhine River. The lines were built at a cost of about $2,140,000. One is 20 miles in length and connects the port with the refinery of Hydrierwerke Scholven at Gelsenkirchen. The other line, about 7 miles in length, extends from the port to the Ruhrchemie refinery at Oberhausen-Holten.

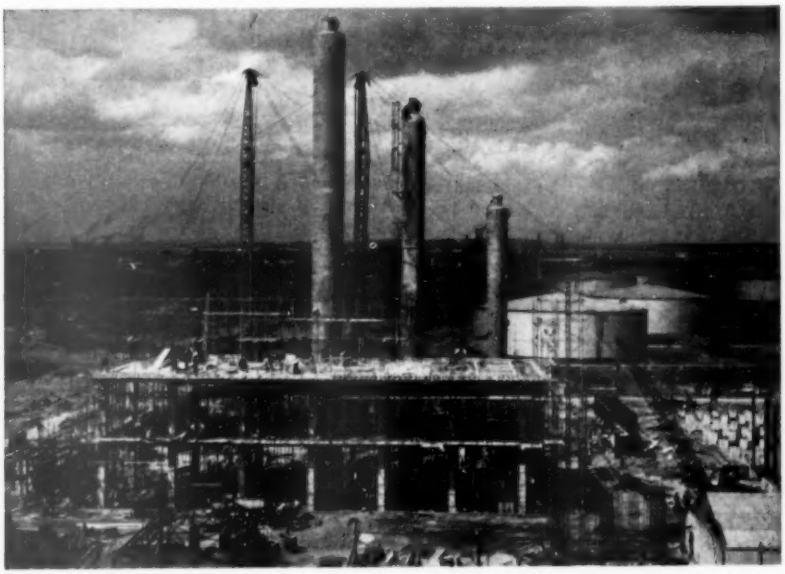
D'Arcy Exploration Co., Ltd. (Anglo-Iranian), is making arrangements for its first test well in Sicily. The well will be drilled by contractors on the Vittoria concession, using equipment capable of going to 8,000 to 10,000 ft. The company has carried out geological, gravity, and seismograph work on the acreage it holds around Ravanusa, Vittoria, and Priolo in southern and eastern Sicily.

Several oil companies are reported to be interested in the possibility of developing natural-gas production in the south Swiss Canton of Tessin. Reports in Zurich were that work now planned includes geological studies to be followed by test drilling.

A group of Japanese engineers and technicians recently surveyed the former Japanese Naval Fuel Arsenal at Yokkaichi to determine the condition of the oil-refining facilities at the arsenal and whether they are still usable. The survey was carried out at the request of government authorities to provide information on appraising the property for its sale.

A second unit in the carbon-black plant of Cabot Carbon, Ltd., at Ellsmere Port near Liverpool, England, was officially opened recently. The new equipment has doubled the initial capacity of the installation, which first began operations in July 1950 with an annual capacity of 20,000,000 lb. Cabot Carbon, Ltd., which is the British subsidiary of Godfrey L. Cabot, Inc., Boston, said the production from the first unit had resulted in a dollar savings to Britain of $4,000,000 in less than 3 years.

Forty-three tankers totaling 1,113,685 tons deadweight and 717,170 tons gross were under contract in United States yards as of June 1, according to the Shipbuilders Council of America. These figures comprise 73 per cent of the merchant shipbuilding going on in the country. During the month of May, two tankers were delivered, one of 29,000 dwt. by Bethlehem Steel Co. to Rio Venturado Cia., S.A., and the other a 26,000-ton vessel to Esso Shipping Co. by Newport News Shipbuilding & Dry Dock Co.



England's First Platforming Unit Taking Shape

Now taking shape at Shell's Stanlow refinery near Ellesmere Port in Cheshire, England, is the first Platforming unit to be erected in the United Kingdom. In this view of the unit during construction, the pump house is in the foreground. The steel structure at right will carry the reactors. The unit is scheduled for completion by the end of this year at an estimated cost of about $10,000,000. Crude capacity of the Stanlow refinery is 85,000 bbl. daily, including 12,000 bbl. daily by thermal units used for distillation. Stanlow also has 10,000 bbl. daily capacity in catalytic cracking.

Research Geologist

Fisk is proof teachers can succeed in business world

THOSE who know Dr. Harold N. Fisk believe he has blasted the theory that "there are those who teach and those who do."

For Fisk, who got his start as a teacher, has proved he could put his extensive formal education to practical use in the business world.

He is best known as chief of the geologic research section of Humble Oil & Refining Co.'s exploration department in Houston. Another title that brings him distinction is that of president of the Society of Economic Paleontologists and Mineralogists.

Fisk grew up in Oregon and received both his bachelor's and master's degree from the state university. He did graduate work at Northwestern University and the University of Cincinnati, where he received his Ph.D.

He joined the faculty of Louisiana State University in 1935 as an instructor in mineralogy and later became a geology professor. He was with the University until 1948, when he became a full-time employe of Humble.

Even while serving on the university's faculty he had numerous outside contacts. He was research geologist in charge of field investigations for the Louisiana Geological Survey from 1937 to 1941. From 1941 to 1948 he was consultant for the Mississippi River Commission, U. S. Army Engineers, and various law firms. Since joining Humble he has continued to serve as a consultant to the commission.

Among his most outstanding geological papers is that on "An Investigation of the Alluvial Valley of the Lower Mississippi River."

He is a member of Sigma Xi, Sigma Gamma Epsilon, and the Geological and Mining Society of American Universities, all honorary societies, and the American Association of Petroleum Geologists and the American Geophysical Union. He is a fellow of the Geological Society of America.

In spite of his active participation in these groups, he still finds time to practice his hobby of photography.

Oscar W. Morton has resigned as acting assistant deputy administrator in charge of the gas branch of the Petroleum Administration for Defense and will return to Panhandle Eastern Pipeline Co., where he is a vice president. He will be on temporary assignment in Panhandle's Washington, D. C., office. Morton joined PAD in March 1951. **Harold P. Reynolds** has been named assistant deputy administrator and general counsel of PAD, succeeding **William Simon,** who has resigned to enter private law practice.

L. CADE

S. VAZQUEZ

Lawrence Cade, Siro Vazquez, Martin E. Jones, and **Leo E. Lowry** have been elected directors of Creole Petroleum Corp. in Venezuela. For the past year Cade has been in the Caracas office as a member of the management committee. Dr. Vazquez joined the company as a driller in 1937 and later became chief petroleum engineer and manager of the production department. Lowry has resigned as company comptroller to accept his new post, and Jones has been a member of the management committee since June 1950. **John E. Andrews** has been named company comptroller succeeding Lowry.

M. E. JONES

L. E. LOWRY

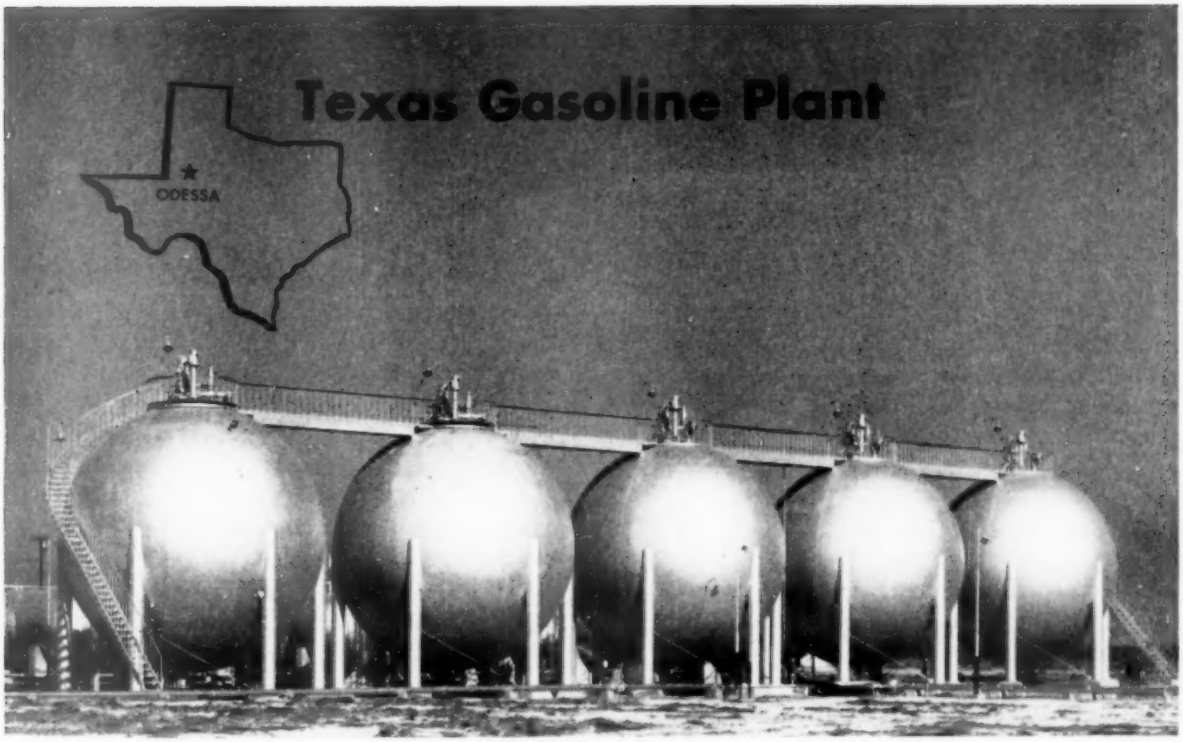
Jimmy D. Harrington has joined Keller & Peterson, Fort Worth consulting engineers, as a petroleum engineer. He formerly was division reservoir engineer for Magnolia Petroleum Co. in Midland, Tex.

Carl E. Davis, Midland, Tex., formerly district landman for Sunray Oil Corp., has been transferred to general offices in Tulsa as staff assistant in the exploration department. **John W. Goddard** has been named district landman and manager of the Midland district exploration office. **Robert M. Robbins,** geologist in Albuquerque, N. M., has been transferred to Midland.

Farrell F. Thomason, district foreman for Sinclair Oil & Gas Co., has been transferred from Midkiff, Tex., to Odessa, Tex. Other company changes include: **Robert W. Hawks,** promoted from junior petroleum engineer in Nowata, Okla., to intermediate petroleum engineer; **John W. Edwards,** junior petroleum engineer, transferred from Kiefer, Okla., to Tulsa; **Robert R. Blair,** junior petroleum engineer in Chase, Kans., promoted to assistant district foreman in Gainesville, Tex. **Vernon R. Hughes,** junior petroleum engineer, transferred from Tulsa to Corpus Christi; **Edward J. Lisius,** junior petroleum engineer, transferred from Oklahoma City to Drumright, Okla.; **William A. Russell,** district foreman in Andrews, Tex., transferred to Midkiff; and **Charles J. Eskridge,** district foreman, transferred from Odessa to Andrews, Tex.

Cecil R. Maxey has been appointed southwest marine division manager for Pure Oil Co., succeeding the late **Russell L. Vernor.** He formerly was assistant manager in the division. He will continue to make Beaumont, Tex., his headquarters.

H. F. Moses, vice president of Carter Oil Co., Tulsa, in charge of exploration and research, has been appointed deputy manager of the exploration department and deputy chief geologist for Standard Oil Co. (N. J.). He will leave Carter September 1 to assume his new post in New York. **Nelson Y. Ruth,** manager of exploration, has been elected to the Carter board of directors and will act as contact director for the exploration department.



stores Natural Gasoline and Butane in

HORTONSPHERES*

Light hydrocarbons such as butane cannot be stored at atmospheric pressure and temperature. Gulf Oil Corporation's Waddell gasoline plant stores butane in three of the five 2,500-bbl. Hortonspheres shown above which are designed to operate at 100 lbs. per sq. in. pressure. Natural gasoline is stored in the other two Hortonspheres which are designed for an operating pressure of 30 lbs. per sq. in. Hortonspheres are built in standard capacities from 1,000 to 30,000 bbls. Information on these efficient storage units or other Horton structures may be obtained by writing our nearest office.

Welding supervisor checks construction of every HORTONSPHERE

A Chicago Bridge & Iron Company Field Welding Supervisor is assigned to follow the construction of every tank we build. This service, which assures you that the tank is built in accordance with the specifications, is yours at no extra cost.

**Trade Mark registered in U. S. Patent Office*

CHICAGO BRIDGE & IRON COMPANY

Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PENNSYLVANIA

Atlanta, 3 ..... 2154 Healey Bldg.
Birmingham, 1 ..... 1536 North 50th St.
Boston, 10 ..... 1025-201 Devonshire St.
Chicago, 4 ..... 2128 McCormick Bldg.
Cleveland, 15 ..... 2204 Midland Bldg.
Detroit, 26 ..... 1514 Lafayette Bldg.
Havana ..... 402 Abreu Bldg.
Houston, 2 ..... 2119 C & I Life Bldg.
Los Angeles, 17 ..... 1523 General Petroleum Bldg.
New York, 6 ..... 3347-165 Broadway Bldg.
Philadelphia, 3 ..... 1615-1700 Walnut Street Bldg.
Pittsburgh, 19 ..... 3228 Alcoa Bldg.
San Francisco, 4 ..... 1554-200 Bush St.
Seattle, 1 ..... 1325 Henry Bldg.
Tulsa, 3 ..... 1606 Hunt Bldg.

REPRESENTATIVES AND LICENSEES

Horton Steel Works, Limited, Fort Erie, Ontario, Canada
Ateliers et Chantiers de la Seine Maritime, Paris, France
Constructions Metalliques de Provence, Arles-sur-Rhone, France
Chicago Bridge & Iron Company, Ltd., Apartado 1348, Caracas, Venezuela
Comprimo, N.V., 21, Amstel, Amsterdam (C) Netherlands
Compagnia Tecnica Industria Petroli, Rome, Italy
Whessoe, Limited, Darlington, England
Motherwell Bridge & Engineering Company, Limited, Motherwell, Scotland
Sociedade Chibridge de Construcoes Ltda., Av. General Justo, 275, Grupo 306, Rio de Janeiro, Brazil

This Pipe Has 132 Chances To Fit Your Job

It is a cinch to save money and metal on line pipe jobs. There is no need to compromise—on pipe diameter or wall thickness—when it is so easy to match exact job requirements with Armco Welded Steel Pipe.

By actual count, you have a choice of 20 pipe diameters between 6″ and 36″, and 10 wall thicknesses between 9/64″ and 1/2″—totaling 132 combinations.

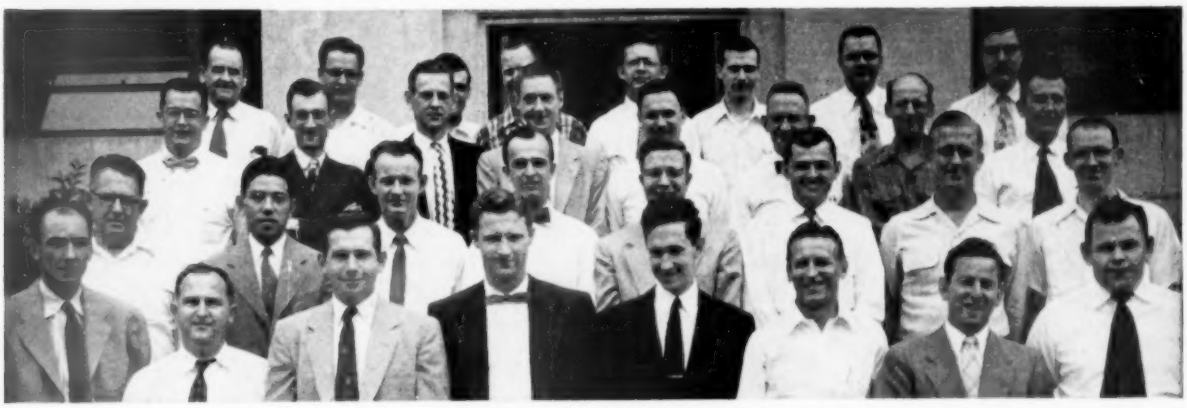
But savings don't stop here. With the long 50-foot lengths of Armco Welded Steel Pipe, installation is easier and faster. And at less cost! Longer pipe lengths mean fewer sections to haul and handle; fewer joints to make. But even here the assembly job is simplified with the specially prepared ends that speed field welding.

Use Armco Welded Steel Pipe with confidence for gathering systems, line pipe and wherever else you need dependable oil and gas lines. Armco Drainage & Metal Products, Inc., Welded Pipe Sales Division, 3923 Curtis Street, Middletown, Ohio. 201 Kome Building, Tulsa, Oklahoma. Subsidiary of Armco Steel Corporation. Export: The Armco International Corporation.

ARMCO WELDED STEEL PIPE

ARMCO

PERSONALS



Phase Behavior of Hydrocarbons Studied

These men took part in an intensive course on the phase behavior of hydrocarbons held recently at the University of Michigan, Ann Arbor. They are: (FRONT ROW) W. F. Cummer, Union Producing Co., Beeville, Tex.; Charles W. Leggett, Fluor Corp., Monterey Park, Calif.; Leon M. Fliner, United Gas Corp., Shreveport; W. D. McDonough, Badger Manufacturing Co., Somerville, Mass.; L. Lee Quay, Carbide & Carbon Chemical Co., Charleston, W. Va.; John Johann, Richfield Oil Corp., Alhambra, Calif.; Albert Abrams, Shell Development Co., Houston; Robert E. McMinn, Black, Sivalls & Bryson, Inc., Oklahoma City; (SECOND ROW) R. L. Huntington, University of Oklahoma, Norman; Riki Kobayashi, Rice Institute, Houston; R. F. Hinds, United Gas Corp., Shreveport; Joseph E. Wolf, Standard Oil Co. (Ind.), Whiting, Ind.; Charles J. Walters, California Research Corp., Whittier, Calif.; Robert E. Latimer, laboratory of Linde Air Products Co., New York; David B. Burrows, Continental Oil Co., Ponca City, Okla.; James M. McDowell, Gulf Research & Development Co., Verona, Pa.; (THIRD ROW) Lee S. Gaumer, Air Products, Inc., Allentown, Pa.; A. P. Snyder, Kendall Refining Co., Lewis Run, Pa.; John E. LeGros, Shell Chemical Corp., New York; Stanley Ohlswager, Sinclair Research Laboratories, Inc., Matteson, Ill.; Leonard Krawitz, Lummus Co., New York; L. O. Case, University of Michigan; Jack Huebler, Surface Combustion Corp., Sylvania, Ohio; Martin T. Farrell, Gulf Refining Co., Shreveport; (FOURTH ROW) Harold S. Forgeron, petroleum consultant, Midland, Tex.; Herbert L. Stone, Vulcan Copper & Supply Co., Cincinnati; Edwin D. Cable, Republic National Bank, Dallas; Ralph R. Haney, Arabian American Oil Co., New York; Lester G. Massey, Universal Oil Products Co., Chicago; Floyd T. Chambers, Richfield Oil Corp., Van Nuys, Calif.; R. R. White, University of Michigan; Dr. D. L. Katz, University of Michigan.

Dee Davis has been elected a vice president of The California Co. He will continue as a director, and as secretary and treasurer, and head of activities in the finance department.

George W. Clarke, manager of the Central division of Stanolind Oil & Gas Co. in Oklahoma City, has been elected a vice president. Other division managers elected vice presidents include **John R. Evans,** Fort Worth, North Texas-New Mexico division, and **F. R. Yost,** Houston, Texas-Louisiana Gulf Coast division. All are members of the company's board of directors.

Carl Herrington, a director and manager of the production department of Carter Oil Co., has been elected a director of Interstate Oil Pipe Line Co.

Robert S. Baker, mud analyst for Phillips Petroleum Co. in Pauls Valley, Okla., has been transferred to Drilling Specialties Co., company subsidiary, as district engineer in Corpus Christi.

Harry R. Moseley has been appointed Gulf Coast division superintendent for Texas Eastern Production Corp. in Houston. He joined Texas Eastern in 1951 as district petroleum engineer in Shreveport and was transferred to the Houston office last year.

J. S. WELBOAN

V. E. CHILD

J. S. Welboan, Jr., has been promoted to assistant division manager for The Texas Co. in Houston. He has been with the company since 1936. **V. E. Child** has been promoted to assistant to the division manager and will continue to be located in Houston. **T. L. Kunkel** has been promoted from supervisor of geophysical operations in the West Texas division in Fort Worth to assistant to the division manager in Houston.

W. F. Davis, formerly assistant to the general manager, has been appointed assistant general manager for Interstate Oil Pipe Line Co., Shreveport.

Thom H. Green, former division geologist for Sunray Oil Corp., has resigned to become chief geologist for Fargo Oil Co., Calgary, Alta. Green had been associated with Sunray since 1948 and was formerly Sunray district geologist at Oklahoma City. He was previously associated with Shell Oil Co. as geologist and geophysicist.

Harry A. Buchanan, superintendent of field operations for Bell & Burden, Inc., drilling contractors, has been elected vice president. He will continue to make Ventura, Calif., his headquarters.

J. A. Horner has been appointed secretary of Shell Oil Co., succeeding **F. W. Woods,** who has retired.

Frank H. Clements, engineer for Stanolind Oil & Gas Co., has been transferred from the North Cowden area to Tulsa.

Fred W. Bush, manager of lands in the Pacific Coast area for Union Oil Co. of California, Los Angeles, has been appointed manager of exploration in the Williston basin division. His headquarters will be in Bismarck, N. D. **K. C. M. Anderson,** formerly assistant to the manager of field operations in the Pacific Coast area, has been named administrative assistant for the field department, a newly created position. **B. B. Brison** has been transferred from Union's field office in Santa Paula,

PERSONALS

Calif., to the head office group as assistant manager of field operations in the Pacific Coast.

Harold K. Heberling, junior petroleum engineer for Stanolind Oil & Gas Co., has been transferred from the Hastings area near Houston to Beaumont, Tex.

Edward A. Gribi, Jr., has resigned from Chamberlain & Associates, Great Falls, Mont., to open a temporary consulting geological office there. He plans to relocate in Denver later this year.

Thomas P. Simpson has been named assistant director of manufacturing for General Petroleum Corp., Los Angeles, effective August 1. Since 1947 he has been director of the research and development laboratories of Socony-Vacuum Oil Co., Inc., at Paulsboro, N. J. General Petroleum is an affiliate of Socony-Vacuum.

Albert E. Urich has been appointed general manager of purchases for Gulf Oil Corp., succeeding **C. W. Lutz,** who recently was promoted to administrative coordinator for the production and exploration department.

B. J. Hinson, formerly a field engineer for Stanolind Oil & Gas Co. in Henderson, Tex., has been appointed a district engineer for Buffalo Oil Co. in Artesia, N. M.

Brame Womack, staff geologist in the production department headquarters of Sohio Petroleum Co. in Oklahoma City, has been named manager of Sohio's Canadian operations. His new headquarters are in Regina, Sask.

Fred H. Cummins has been promoted from assistant material man for Shell Pipe Line Corp. in Austin, Tex., to pipe-line maintenance foreman in Tecumseh, Okla.

F. J. Blaise, Pure Oil Co., Chicago, has been reelected chairman of the federal tax forum of the Mid-Continent Oil & Gas Association. **R. M. McGowen,** Stanolind Oil & Gas Co., Tulsa, has been elected to succeed **Riley Frick,** Tide Water Associated Oil Co., Tulsa, as vice chairman.

C. G. CORTELYOU

V. M. STANICH

Curtis G. Cortelyou has been named manager of General Petroleum Corp.'s Ferndale, Wash., refinery, which is now under construction. He has been with General Petroleum since 1938 and has served as job engineer, project engineer, and chief design engineer. **V. M. Stanich** has been appointed chief engineer at the refinery. Stanich has been a lubrication engineer, chemical engineer, and refinery engineer for the company.

H. J. McNally, chief production engineer in charge of engineering activities for Kewanee Oil Co., Tulsa, has been promoted to general superintendent. **J. K. Wetherill,** assistant district geologist, has been appointed acting manager of the land and geological department. **David E. Reed,** for the past 7 years a geological and geophysical consultant in Tulsa, has joined Kewanee's Tulsa office as a geologist and geophysicist. **Coy L. Watson,** assistant district geologist in Midland, Tex., has been promoted to district geologist in the newly created Denver office. **Earl J. Chrisholm,** formerly a geologist in the Midland office, has been named to direct activities in the new office in Abilene, Tex.

Marcel A. Baur, district manager for Socony-Vacuum Oil Co., Inc., in Cleveland the past 7 years, was scheduled to sail from New York July 7 for Dakar, French West Africa. He will become general manager of Societe des Petroles Socony-Vacuum de l'Afrique Occidentale Francaise after a short orientation period.

Leo D. Welch, treasurer of Standard Oil Co. (N. J.), has been elected to Jersey's board of directors. Before joining Jersey in 1944 he was with the National City Bank of New York for 25 years.

R. K. Schlafly has been named chief maintenance engineer in the Cleveland refinery of Standard Oil Co. (Ohio). He formerly was head of the contracts-engineering section.

Norman Schultz, formerly district petroleum engineer for General Petroleum Corp. at San Ardo, Calif., has been transferred to the Rocky Mountain area as division petroleum engineer.

DEATHS

James A. Patton, 53, Dallas, independent oil operator, died recently in a Dallas hospital.

Marvin Lee, 63, administrative geologist for Cooperative Refinery Association, a division of Consumers Cooperative Association, died July 7 in Kansas City. He formerly was a consulting geologist in Wichita and a technical adviser to the Kansas Corporation Commission.

Charles J. Johnson, 37, assistant district superintendent, and **James I. McMillan,** 24, and **A. J. Faulkner, Jr.,** 27, engineering trainees, for Oklahoma Natural Gas Co., Tulsa, died of burns resulting from a gas-line explosion near Tulsa July 6.

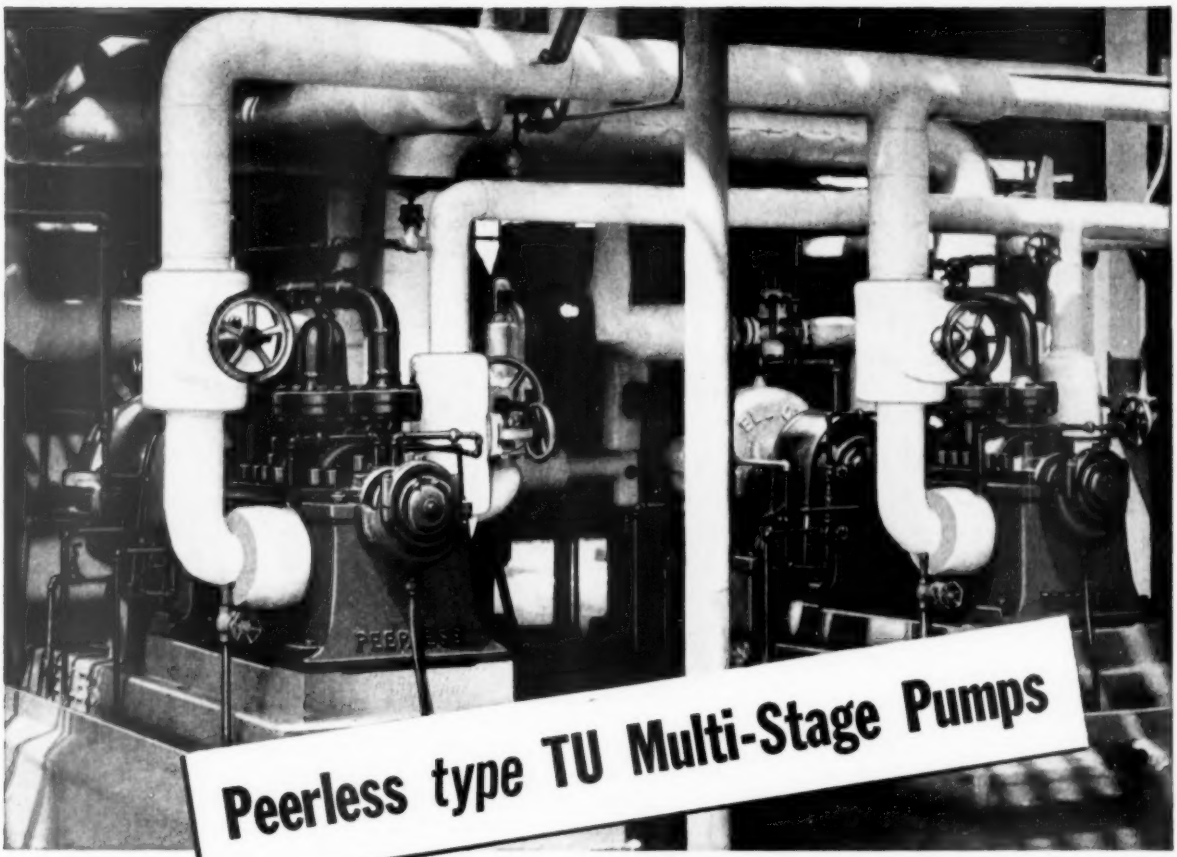
John T. Emery, 92, retired drilling contractor, died July 6 at his home in Tulsa. He was a native of Butler County, Pennsylvania, and came to Oklahoma in 1916. He had been a driller in Pennsylvania, West Virginia, Ohio, Illinois, Texas, and Oklahoma oil fields.

Scott C. Beesley, Sr., 66, vice president of Reda Pump Co. and formerly treasurer of the old Marland Oil Co., died July 6 in Tulsa.

William O. Davidson, 48, secretary of Monterey Oil Co., Los Angeles, died recently in a Santa Barbara, Calif., hospital.

Dr. Charles C. Taliaferro, 66, Petersburg, Ind., died July 1. He formerly owned Bement Gas Co., Petersburg, and at the time of his death was president of Oil Electronics, Inc., Jasper, Ind.

Roy Raymond Maines, 67, retired oil tank-car firm owner, died July 7 in Tulsa. He formerly was traffic manager for the old Gypsy Oil Co., Mid-Continent Petroleum Corp., Sinclair Oil & Gas Co., and other oil firms before buying a fleet of railroad tank cars.



Peerless type TU Multi-Stage Pumps

PEERLESS PUMPS

GENERAL SPECIFICATIONS

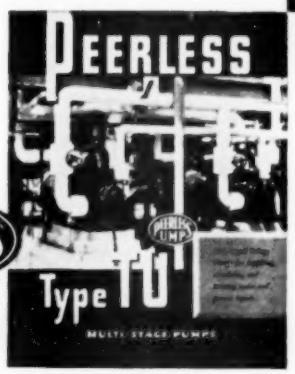
HEADS	Up to 1600 Feet
CAPACITIES	Up to 3000 GPM
TEMPERATURES	Up to 300°F
CASE PRESSURES	Up to 800 Lbs.
HP RANGE	Up to 325 BHP
DRIVES	All Types
CONSTRUCTION	Cast Iron, Bronze, Stainless

PEERLESS PUMP DIVISION
FOOD MACHINERY AND CHEMICAL CORPORATION
Address inquiries to Factories at: Los Angeles 31, Calif. & Indianapolis, Ind. *Offices:* New York; Chicago; Indianapolis; St. Louis; Atlanta; Tulsa; Plainview and Lubbock, Texas; Fresno; Los Angeles; Phoenix; Albuquerque, New Mexico.
Distributors in Principal Cities; Consult your Telephone Directory

PEERLESS PUMPS fmc

4 COST-SAVING FEATURES OF THE TYPE TU LINE

- *SIMPLICITY IN DESIGN*
- *GOOD HYDRAULIC CHARACTERISTICS*
- *DURABLE, RUGGED CONSTRUCTION*
- *ON-THE-JOB DEPENDABILITY*



2, 3, 4 AND 5-STAGE PUMPS FOR SUPPLYING CIRCULATING AND BOOSTING WATER AND PROCESS LIQUIDS AGAINST MEDIUM AND HIGH HEADS. Put these dependable pumps to work for you. They'll deliver high maintained efficiencies over an extended service life. Their split-case design makes them easy to service and maintain. Their precision construction guarantees year after year durability. In all sizes 4" and under, cross over between stages is built integral with upper pump case. Over-size shafts, wear rings, shaft sleeves, heavy duty ball bearings, modern case and impeller design are outstanding features. Choose from many types and sizes for all head and capacity requirements.

PROFUSELY ILLUSTRATED BULLETIN. A new 4-color bulletin describes the Peerless Type TU pumps. It's complete with pump cross-section, dimensional drawings and load-capacity data. Use coupon below.

MAIL COUPON FOR NEW BULLETIN

PEERLESS PUMP DIVISION
Food Machinery and Chemical Corporation
301 West Avenue 26, Los Angeles 31, California

Please send a copy of TU Pump Bulletin No. B-1400 to:

NAME _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____

O.&G.J.

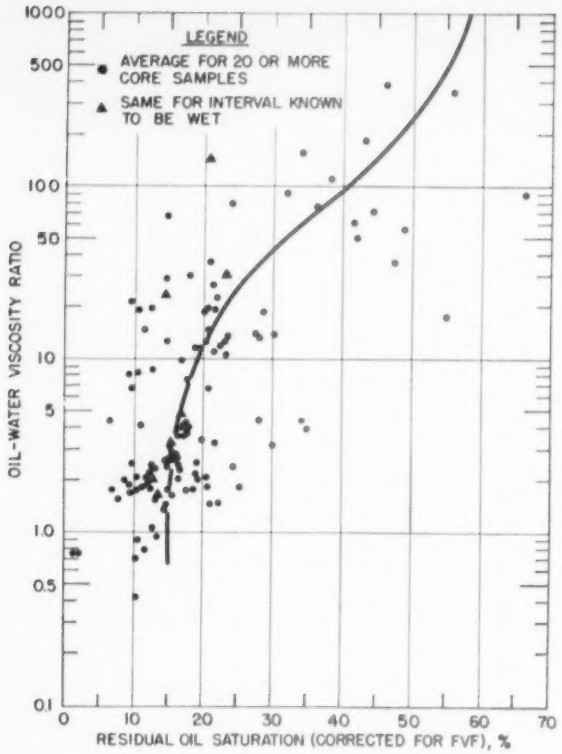

LEGEND
AVERAGE FOR 20 OR MORE CORE SAMPLES
SAME FOR INTERVAL KNOWN TO BE WET
OIL-WATER VISCOSITY RATIO
RESIDUAL OIL SATURATION (CORRECTED FOR FVF), %

Fig. 1—Wire line core residual oil saturation versus oil-water viscosity ratio. Significant effect of viscosity is shown.

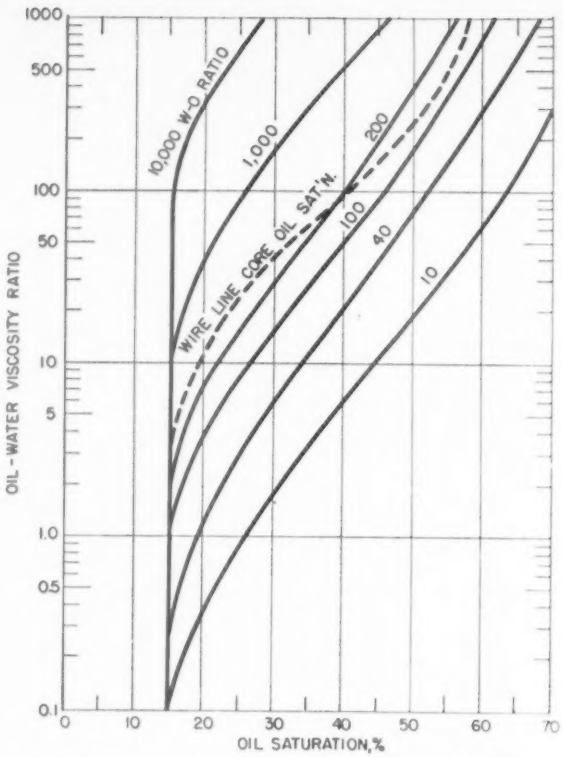


Fig. 2—Effect of crude-oil viscosity on secondary recovery in subordinate-phase displacement from unconsolidated sands.

Residual-Oil Content of Water-Base Wire-Line Cores as a Criterion of

WATER FLOODABILITY

by Norris Johnston,* T. J. Nowak,† and J. E. Klipp‡

RESULTS of an examination of 10,464 California wire-line core analyses show:

- **The residual-oil saturation depends on the reservoir oil-water viscosity ratio.**
- **However, the correlation is semi-quantitative only in the low oil-viscosity range; the deviations are so large in the range of high-viscosity oils as to make the use of wire-line core residual oil content as a criterion of floodability for the heavier oils not recommended.**
- **A tentative borderline, at 3,000-ft. depth, of 30 for the oil-water viscosity ratio is useful.**

Introduction

As the availability of oil by primary depletion methods begins to fall below the demand, two courses are open: New field may be sought, or greater recovery may be sought from known fields. Starting in the East and gradually working its way West, there has been a steadily growing trend toward increasing the recovery from known pools by secondary means. The most efficient of these where applicable is water flooding.

Not all pools are equally susceptible to the efficient recovery of oil by water flooding, there being several physical properties that make flooding economically unfeasible. The evaluation of these factors may be carried out by laboratory means or by actually developing a pilot-flooding project in the field.

Laboratory work is helpful in picking the best prospects for pilot plant or full-scale flooding. It costs a very small fraction of the cost of even a pilot flood, and in many cases can render a definite recommendation as to whether or not a given oil pool will react favorably and economically to water injection.

The usual laboratory method is the flood-pot evaluation involving conventional cores. Flood-pot tests determine chiefly the minimum residual-oil content after water flooding. If the operator knows the present oil content of his pool, a knowledge of this residual after flooding will tell him the future recovery of secondary oil, as a basis of an economic study of the adaptability of this sand to flooding.

This paper . . . The aim of the present investigation is to determine whether

*Petroleum Technologists, Inc., Montebello, Calif., †Union Oil Co., Research Center, Brea, Calif., and ‡Sunray Oil Corp., Newhall, Calif. This paper results from the activities of Study Committee on Fluid Injection of the A.P.I. Pacific Coast District Committee on Production Practice; paper presented at annual A.P.I. West Coast spring meeting, June 1953, Los Angeles.

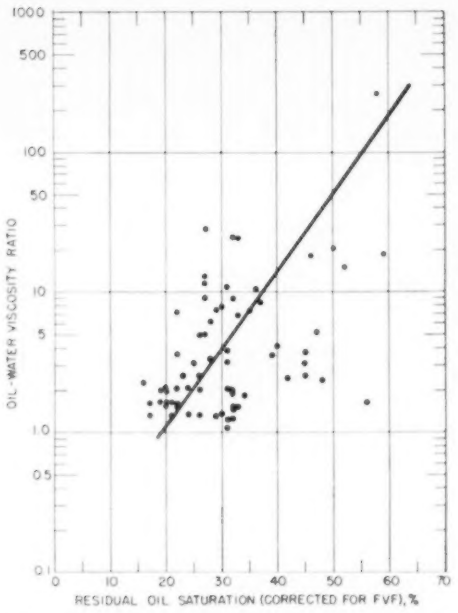


Fig. 3—Residual oil saturation versus oil-water viscosity ratio for water drive fields.

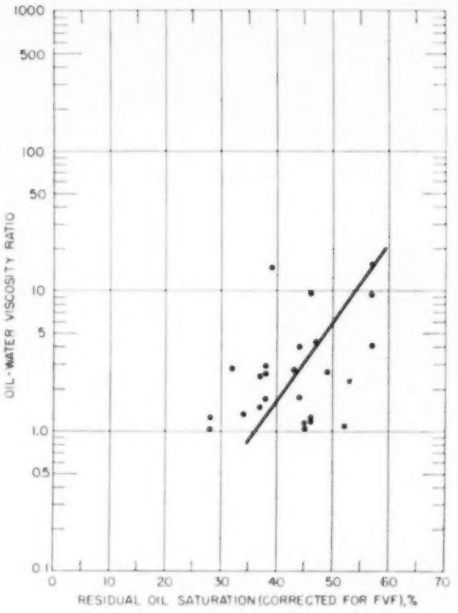


Fig. 4—Residual oil saturation versus oil-water viscosity ratio for gas drive fields.

the floodability of an oil sand can be predicted from other tests, such as the routine analysis of wire-line cores cut with water-base mud. For the present paper, **"floodability"** is defined as: **"The ability of a water drive through an oil sand to reduce the oil saturation."**

The reasoning which led to the examination of water-base wire-line-core oil content as a possible criterion of floodability was that wire-line cores may be flushed during the coring process to a minimum residual-oil content comparable to that obtained in the flood-pot evaluation. The factors which control the oil content of a wire-line core are numerous and are interrelated in a rather complex manner. They include such matters as: Vertical permeability, laminarity of the sand, oil viscosity and mobility, speed of coring, mud weight, formation pressure, and gas-oil ratio, as well as several minor factors such as the ratio of core diameter to hole diameter.

Literature . . . Many of these factors have been thoroughly discussed in the literature. Mullane[1] has discussed the flushing of the core vertically downwards ahead of the bit, and radially inward at the moment of cutting. He concluded that in general, small-size cores, like those cut with wire-line equipment, are rather thoroughly flushed. Botset and Muskat[2] have discussed the depletion of a core in the barrel on release of pressure consequent to bringing the core to the surface, a subject also discussed by Mullane. Expansion of the porous structure on release of overburden pressure and further expansion caused by hydration swelling of clay also effect changes in the fluid-core system.

The mechanism of oil displacement by invasion of filtrate into a core is similar in many respects to that involved in flooding a pool, or running a flood-pot test. The method of evaluating the distribution of oil saturation behind a flood front has been developed by Buckley and Leverett,[3] who define the initial and subordinate phases of oil displacement. Based on this work, Heath[4] has computed the water-oil ratio of subordinate phase displacement. From his results, the curves of Fig. 2 were drawn relating the residual-oil saturation to the oil viscosity (assuming water viscosity = 1 cp.) for a range of instantaneous water-oil throughput ratios. It is evident from these curves that the higher the oil viscosity the greater the dependence of residual-oil saturations on the amount of water. At the low oil viscosities, a minimum residual saturation is obtained with rather small water throughput, and the oil content is not further reduced by excessive volumes of water. The wide spread of the Heath curves at high oil-water viscosity ratios is entirely parallel to the observed wide spread of wire-line core oil (saturation values shown in Fig. 1), as will be described below.

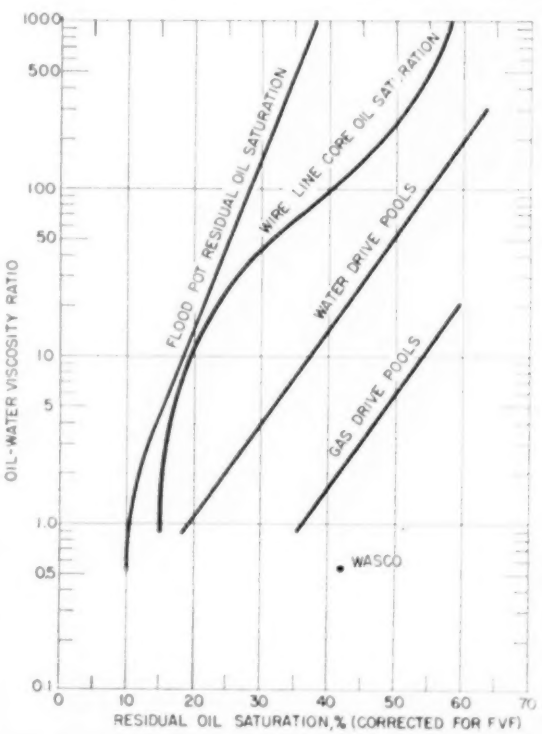


Fig. 5—Residual oil versus oil-water viscosity ratio for various recovery mechanisms.

Other physical factors than oil-water viscosity ratio were studied. Large-scale bypassing which occurs in the reservoir cannot be evaluated by a single core sample or flood pot, but requires rather a complete permeability profile. It can be better developed by a method like that of Dykstra and Parsons.[5] A low oil saturation in flood-pot sample or wire-line core sample may mean either thorough flushing during coring or simply low reservoir oil saturation.

With this theoretical background, the present study was undertaken.

Core data to extent of 10,464 samples were gathered from seven

operators in California pools. The data were completely unidentified as to pool or zone. Table 1 gives all the data collected, in which generally 20 or more core samples could be grouped into a single tabular value. The headings in Table 1 show the complete nature of the auxiliary data, so that a variety of correlations could be studied.

Fig. 1 shows all the data from Table 1. These data on residual-oil content show above all other characteristics a significant variation with oil viscosity. The lower residual-oil saturation corresponds to the lower oil viscosity.

The present single mean curve representing all data indiscriminately shows a steep portion at a substantially constant oil saturation of 15 per cent for the low-viscosity oils. This approximates a "critical oil saturation," below which the relative permeability to oil is substantially zero, thus representing a condition of complete flushing. Then there is a sweep toward higher oil saturations starting at a viscosity ratio of about 2, and tending to straighten up again to a somewhat constant value of oil saturation near 60 per cent for viscosity ratios of 1,000 and greater. This latter region is characterized by little or no flushing, so the core saturation will be substantially the reservoir value, and cannot be predicted by the curve. The mean slope of this curve shows about 16 per cent oil saturation change for each 10:1 change in viscosity ratio.

In Table 1, the core-oil content has been corrected to reservoir conditions at time of coring, so as to be comparable with field data, using Standing's[6] correlations. The oil viscosities have been worked out from Beal's[7] correlations. All saturations are expressed in per cent of pore space.

Correlations other than that against oil-water viscosity ratio were attempted.

Table 1—Core Analyses of California Wire-Line Cores Taken with Water-Base

Depth of interval	Porosity (per cent)	Air perm. (md.)	Core-oil saturation per cent of pore vol.	Reservoir pressure and coring (psia.)	Reservoir temp. (°F.)	A.P.I. gravity (stock-tank oil)	R solution (G.O.R.)	B form. volume factor	μ_o Viscosity of gas sat. oil at res. temp. and press.	μ_w Viscosity of water at res. temp.	Interstitial water (per cent)	Initial water cut of interval (per cent)
800	35.0	10,000	75.0	200	100	14	15	1.02	950	0.68	20	
2,300	41.3	1,295	66.5	1,010	130	15.5	125	1.07	45	0.50	21	0.3
1,850	35.6	4,250	55.9	370	120	16	0	1.03	200	0.56	15	
3,600	29.8	298	55.3	1,250	140	22	160	1.09	8	0.46	22	100
2,950	29.5	1,560	49.0	1,120	145		140	1.09	25	0.44		1.6
2,450	35.5	1,166	47.5	1,150	140	18.5	150	1.09	17	0.46	22	0.1
2,050	40	14,000	47.3	775	125	11.2		1.05	800	0.43		2.0
3,000	35.2	448	46.1	1,170	150	11	90	1.07	165	0.43		
2,180	40	14,000	45.3	775	125	11.2		1.05	800	0.43		2.0
2,000	37.8	936	44.2	600	95	13	50	1.03	520	0.72		40
2,840	36.5	1,219	43.2	1,120	145	12.7	123	1.08	80	0.44	21	5
2,400	39	10,000	43.0	775	125	11.0		1.05	1,100	0.43		2.0
2,900	36.5	3,930	41.9	900	145	17.7	115	1.08	22	0.44		0.3
2,900	31.8	162	41.5	1,200	145	16.6	152	1.09	27	0.44		5.0
3,300	30.0	1,000	38.2	1,000	139	14.8	90	1.07	52	0.47	17	
2,320	38.7	10,950	36.8	775	125	11.2		1.05	950	0.43		5
3,350	27	286	35.9	1,450	160	14.6	130	1.09	31	0.40		
4,630	33	410	35.2	1,540	184	28	243	1.16	1.35	0.35		
4,740	26.3	481	34.2	1,600	187	25	230	1.16	1.45	0.33		
3,400	30	1,000	33.9	700	132	15	60	1.05	76	0.49	17	
3,300	30.2	830	31.8	100	130	20	0	1.04	45	0.49	15	
7,100	22.1	145	30.2	2,900	210	30.3	525	1.31	0.92	0.29	31	
3,350	28.9	715	30.2	900	132	24.5	130	1.08	6.6	0.49	16	
3,200	29.0	350	28.8	500	135	24.0	65	1.05	9.0	0.48	17	
4,200	28.2	515	28.2	600	155	31.0	96	1.08	1.8	0.41	20	
3,400	29	350	28.1	1,000	140	24.0	140	1.09	6	0.46	20	
4,100	24.1	67	27.8	610	156	25.2	80	1.07	5.6	0.41	32	
6,000	20.9	33	25.3	2,500	190	32	490	1.28	0.6	0.33	43	
4,200	25.7	494	24.6	1,400	160	32	280	1.17	1.0	0.40	20	7
4,090	29.2	1,405	23.7	1,250	130	17.2	115	1.07	39.0	0.49	25	0.1
5,200	24	295	23.3	900	170	24.5	120	1.09	3.8	0.36	24	
3,400	29.3	793	23.0	940	133	20.7	120	1.08	15	0.49	15	100
5,950	24.9	156	22.6	2,500	190	33.2	520	1.29	0.5	0.31	30	
3,570	35.1	880	22.3	1,130	163	24	142	1.10	4.7	0.40		
4,950	24.1	295	21.8	175	160	23.4	20	1.05	9	0.40	22	
7,370	30.1	501	21.5	3,465	178	23.2						
4,200	24.0	473	21.3	65	145	26.4		1.05	8.6	0.45	19	
5,350	24.2	170	20.9	2,000	180	33	390	1.22	0.62	0.34	31	
2,890	34.4	1,777	20.9	30	133	23.4	10	1.03	18.0	0.49	20	17
1,847	44.3	29	20.7	50	100	33.4	15	1.02	4.5	0.68	50	22
3,650	24.6	520	20.6	1,050	138	14.0	90	1.06	68	0.47	19	100
5,500	26.4	340	20.4	2,150	180	32	420	1.24	0.70	0.34	30	
8,900	19.5	125	20.1	3,600	189	21.0	480	1.26	4.1	0.33	22	0.2
3,920	31.3	423	20.1	45	170	23.9	45	1.06	7.0	0.37	31	0.3
3,750	29	358	20.0	100	150	16	8	1.05	80	0.43	30	34
4,750	32.1	340	19.9	1,475	187	29.5	240	1.16	1.12	0.33		60
2,120	40	14,000	19.7	775	125	11.2		1.05	1,860	0.43		70
8,200	20.6	24	19.3	3,300	230	30.5	660	1.38	0.52	0.26	37	
8,100	23.2	713	19.1	3,640	215	28.0	640	1.36	0.70	0.28	19	
7,600	18.9	50	19.0	2,610	220	31.0	470	1.29	0.58	0.27	42	
4,080	23.8	145	18.7	1,400	160	32.3	280	1.17	0.96	0.40	27	5
2,900	34.8	184	18.4	400	110	12.3	33	1.03	600	0.61	35	31
4,340	26.4	529	18.3	435	170	35	74	1.08	0.66	0.37		100
2,600	39.0		18.1	800	129	26	120	1.07	5.8	0.50		2
3,400	25.4	411	17.9	250	148	22	23	1.04	13	0.43		60
7,300	16.5	19	17.7	2,500	210	32	460	1.27	0.52	0.29	46	
4,000	33.9	323	17.6	1,130	168	27	140	1.10	2.8	0.37		

The effect of air permeability was found to be quite random. The gas-oil ratio showed some correlation value, in that the higher the gas-oil ratio, the greater the depletion in the core barrel, and thus the lower the residual oil. But this correlation is closely associated with the viscosity parameter and by itself was so weak as to be unworthy of special attention.

Initial oil saturation (formation oil) would doubtless have made a good correlation, but there was insufficient information to allow determination of this value for each case, and the determination if it had been possible would have entailed months of reservoir engineering calculations.

Water cut makes a good correlation for the extremely high cuts as shown below under subsurface residual-oil saturation. The cuts of low and intermediate value could not always be ascribed to the producing sands themselves, so were not made the subject of special study. Formation pressure and depth came close to providing interesting new correlations which were, however, too weak to be distinguished from the chief variable, viscosity, since the latter varies in a partially predictable way with depth and pressure.

Subsurface Residual-Oil Saturation

The sources of information on probable pool residual-oil saturation after water flooding in California are sketchy indeed compared with the core data presented above. Accordingly, they have been supplemented with data from other productive areas as shown below:

A. Completed California floods:

1. Wasco field reservoir study.

2. Cores from oil sands previously watered out.

B. Completed floods east of California.

(Continued on page 120)

Mud in the Hole—Pertinent Reservoir Date of Cored Interval

Depth of interval	Porosity (per cent)	Air perm. (md.)	Core-oil saturation per cent of pore vol.	Reservoir pressure and coring (psia.)	Reservoir temp. (° F.)	A.P.I. gravity (stock-tank oil)	R solution (G.O.R.)	B form. volume factor	μ_o Viscosity of gas sat. oil at res. temp. and press.	μ_w Viscosity of water at res. temp.	Interstitial water (per cent)	Initial water cut of interval (per cent)
5,180	25.3	350	17.6	2,050	178	20		1.19	10.2	0.35		
4,900	30.2	176	17.4	1,540	191	28	240	1.16	1.40	0.32		
6,030	26.6	433	17.3	1,950	218	28	280	1.20	1.0	0.27		
9,700	18.2	52	17.1	4,500	190	30	910	1.49	0.62	0.33		2
6,700	21.1	199	17.1	2,700	208	30		1.38	0.65	0.29		
4,100	29.5	260	17.0	200	155	29	20	1.05	4.0	0.41	26	
4,200	26.9	424	16.8	600	155	31	96	1.08	1.8	0.41	21	98
4,820	28.6	272	16.8	1,390	189	29	220	1.15	1.2	0.33		
7,000	23.9	70	16.8	2,620	210	32	500	1.29	0.50	0.29	37	
7,200	25.3	185	16.7	2,240	210	32	410	1.25	0.66	0.29	30	
4,800	32.1	545	16.5	1,540	188	28	240	1.16	1.40	0.33		
7,150	25.5	181	16.5	1,240	210	32	200	1.16	0.70	0.29	30	
4,900	30.9	391	16.4	1,475	190	29.5	240	1.16	1.15	0.32		98
7,700	23.4	72	16.4	2,100	220	32	360	1.24	0.55	0.27	28	
7,200	22.6	70	16.2	1,700	210	31	280	1.19	0.76	0.29	37	
7,450	20	114	15.8	3,000	223	30		1.46	0.50	0.27		
4,600	26.7	846	15.7	385	174	34	62	1.08	0.90	0.36		98
5,800	21.3	158	15.6	1,980	192	38	500	1.29	0.24	0.32		
8,300	19.5	21	15.6	3,000	240	27.5	470	1.30	0.77	0.24	54	10
6,250	24.1	86	15.5	2,100	190	33.3	420	1.25	0.52	0.32	33	
6,900	22.6	82	15.4	1,500	200	31	250	1.17	0.88	0.30	35	
8,100	20		15.4	3,155	210	33.9	690	1.39	0.35	0.29	40	8
7,600	25	71	15.1	2,750	220	32.2	520	1.31	0.47	0.27	28	
4,250	24.4	531	14.9	100	145	26	0	1.05	9.3	0.45	18	10
6,400	23.0	60	14.9	2,600	200	34	550	1.32	0.43	0.30	37	
7,700	22.6	67	14.7	1,400	220	31.5	220	1.17	0.70	0.27	29	
9,100	19	45	14.6	3,410	190	21.5	460	1.26	4.2	0.33	24	2
2,640	36.6	2,889	14.6	800	115	19.0	85	1.03	40	0.58		
5,550	26.6	440	14.6	2,030	175	35.0	450	1.25	19	0.48	0.36	
7,500	19.5	61	14.6	3,200	220	29.5	560	1.33	0.70	0.27	39	
4,300	29.4	1,877	14.3	600	180	21.2	55	1.08	8.0	0.34	35	75
6,930	22.1	199	14.1	2,800	212	30		1.40	0.58	0.28		
7,620	18.3	41	14.0	3,050	226	30		1.47	0.39	0.24		
7,700	19		13.9	4,700	195	31	1,000	1.53	0.48	0.31	30	10
4,750	19.5	86	13.8	1,445	188	32	250	1.12	0.80	0.33		
6,500	23.9	525	13.5	2,600	204	30		1.36	0.75	0.30		
7,310	18.7	146	13.4	2,950	220	30		1.44	0.52	0.27		
6,200	25.1	132	13.3	2,500	190	33.2	520	1.29	0.50	0.33		100
8,300	13.8	15	13.3	2,700	220	36.1	580	1.34	0.25	0.27	42	
5,440	28.2	570	13.2	2,200	180	28		1.28	1.28	0.34		
6,340	27.4	284	13.0	2,300	190	36	520	1.29	0.35	0.33	23	
8,100	21.5	49	12.6	1,900	230	31	300	1.21	0.63	0.26	31	
5,700	24.7	820	12.5	2,300	188	28		1.36	1.19	0.32		
6,000	25.5	187	12.4	1,000	190	34.3	180	1.14	0.57	0.32	23	
4,200	29.4	1,043	12.4	600	180	22.7	59	1.08	6.6	0.34	34	10
7,170	20.3	64	12.3	2,900	217	30		1.43	0.54	0.28		
6,900	24.7	80	12.2	2,500	200	32	480	1.28	0.58	0.30	35	100
8,300	18.6	27	11.9	3,300	240	30		1.50	0.39	0.24		
7,600	21.4	43	11.7	2,700	210	37.4	630	1.36	0.23	0.29	40	
4,650	19.9	147	11.4	1,165	180	21.7	142	1.12	5.0	0.34		90
6,400	24.4	152	11.1	1,900	200	33.0	355	1.22	0.55	0.30	25	
4,300	28.8	1,033	10.8	300	170	24	33	1.06	7.0	0.36		20
6,030	19.1	100	10.7	2,225	194	37	500	1.29	0.28	0.32		
6,200	22.9	288	10.2	2,225	194	40	500	1.29	0.13	0.31		
9,700	19.5	65	10.2	4,050	240	35.5	880	1.50	0.17	0.24	35	
2,460	39	10,000	10.1	775	125	11.0		1.05	1,100	0.43		80
6,850	32.4	3,460	7.06	2,000	160	34.0	260	1.16	0.7	0.40		38
5,180	23	90	6.8	575	140	28	83	1.04	4.5	0.46		42

PENBERTHY Liquid Level Gages

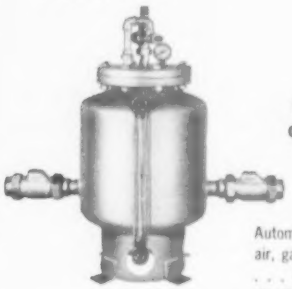
YOU CAN *Remove and Replace Without Shutdown*

Union connections between the gage and the valves permit removal of gage for repairs without shutting down the equipment. Just close the valves, uncouple the unions and remove the gage. The convenience of this is obvious. When glasses have to be replaced or repairs made, it is not necessary to work in an awkward position or to shut down. Another advantage: a gage needing repairs can be replaced immediately by a spare and the repairs made at leisure. There are many other reasons for the superiority of Penberthy Liquid Level Gages; ask for Catalog 35.

OTHER PENBERTHY PRODUCTS

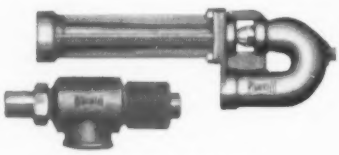
PENBERTHY TRANSPARENT GAGE

Used to observe color and density of liquids under high pressures and or temperatures. Exceptionally sturdy construction —liquid chamber machined from solid block of metal. Ask for Catalog 35.



PENBERTHY CYCLING JET PUMPS

Automatically operated by air, gas or steam pressure . . . Will pump without clogging any liquid that will flow through pipes. Ask for Bulletin 5030.



PENBERTHY EJECTORS

A simple jet pump operated by air, water or steam. Needs no lubrication . . . will not get out of order. Made in wide variety of materials and special units developed to meet unusual conditions. Ask for Bulletin 512.

PENBERTHY EXPLOSION-PROOF SUMP PUMPS

Motor and switch totally enclosed. Underwriter approved for Class 1, Group D, and Class 2, Groups E, F and G hazardous location. Made of copper and bronze throughout. Ask for Bulletin 4929.

4672

PENBERTHY INJECTOR COMPANY

DIVISION OF THE BUFFALO-ECLIPSE CORPORATION

DETROIT 2, MICHIGAN

Established 1886 — *Canadian Plant, Windsor, Ontario*

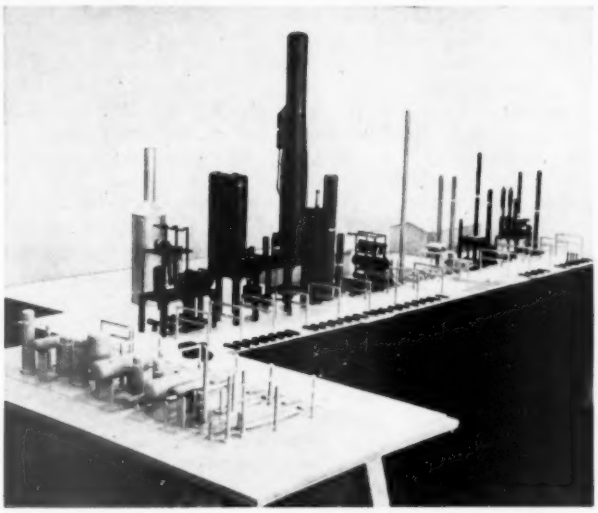


Fig. 1—Preliminary model of a plant with some structural detail shown.

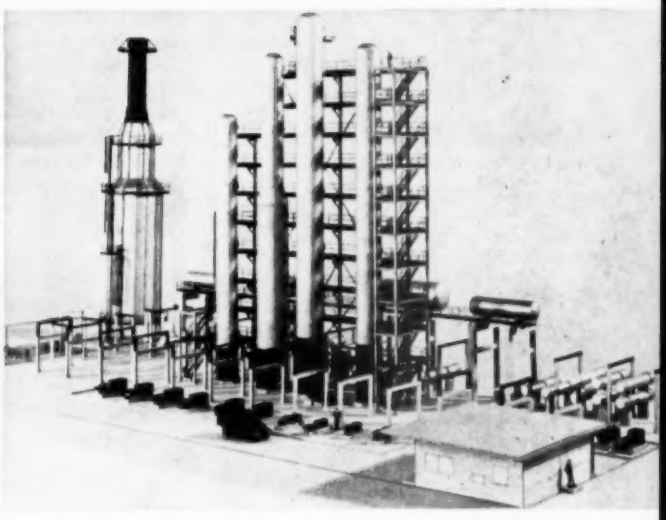


Fig. 2—This structural model shows superfractionation unit for a Texas refinery.

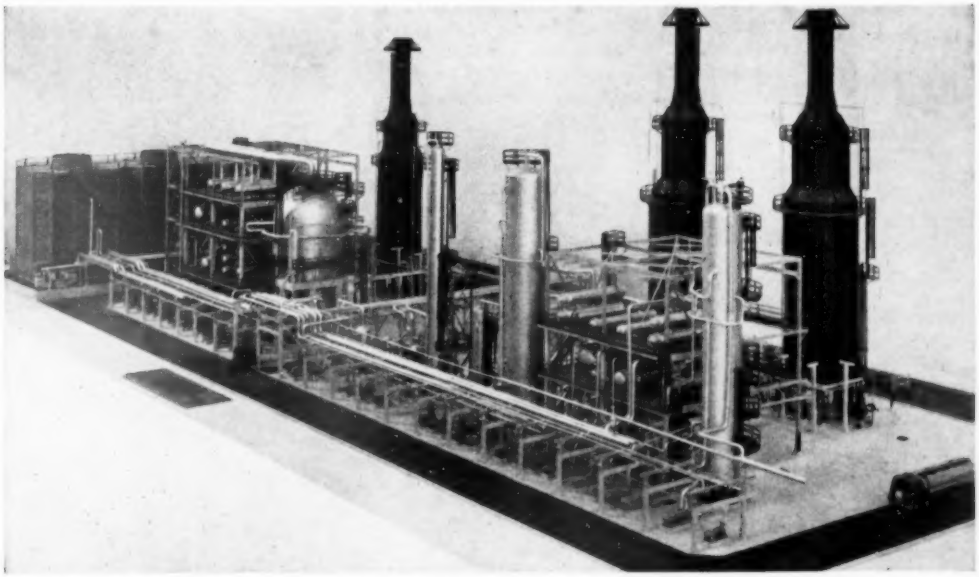


Fig. 3—(Left) Example of completed or piping model is this one showing vacuum and crude topping units recently completed in California refinery.

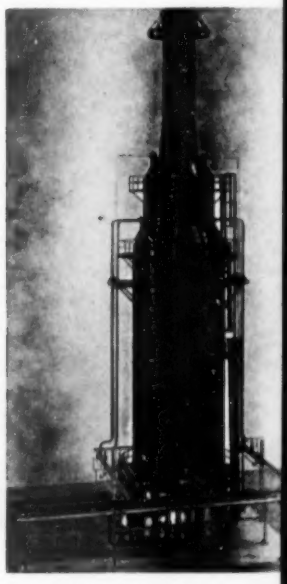


Fig. 4—(Right) Standard models, such as this vertical heater, are used for typical refinery installations.

SCALE MODELS . . .

A new working tool in layout and design

by D. H. Stormont
West Coast District Editor

SCALE models have assumed a definite place in the layout, engineering, and construction of refineries and processing units insofar as Fluor Corp., Ltd., is concerned.

Models are of great value in achieving operability, ease of maintenance, and appearance—three features which the company strives for in plants it designs. From a strictly economic viewpoint, use of models has been found to result in a considerable saving in time and construction costs.

All phases of drafting are expedited, especially in the preparation of piping and electrical drawings. Structural draftsmen are assisted in interpreting design sketches, and structural design-

ers can better plan methods of bracing. In addition the models have been found to be an invaluable aid in the training of new draftsmen.

Operators likewise have found it quite helpful to have a scale model of their new refinery or unit available for training new personnel. In planning maintenance, turnarounds, and future expansion programs, they have been found to be of great assistance.

How constructed . . . All models are made in a shop at Fluor's Los Angeles plant. That this phase has become an integral part of layout and design is evidenced by the fact that the 20-man staff shortly will move into new quarters containing 12,000 sq. ft. of floor space. This building will be especially designed for a combination of plant designers and model makers working together to produce models of plants in the very early stages, so that plant arrangements can be approved and finalized before many man-hours are expended.

Model building is carried out as a complement to drafting. Usually both phases develop at about the same pace, with drafting sometimes running ahead of model building and at other times the reverse being true.

All models are built on the exact scale of ¼ in. = 1 ft. This practice enables the model makers to "mass produce" scale castings of various pieces of equipment, such as heat exchangers and centrifugal and reciprocating pumps. Columns and horizontal vessels are made from cardboard tubing and wood. Platform, pipe supports, and "steel" structural members are made from wood. Ordinary galvanized fly screen is used to represent grating. For piping, rods of lucite, wood doweling, and other materials are used.

Types of models . . . First step is a preliminaary model, then comes a structural model, and finally the piping model. In addition to these layout and design types, on large, complicated jobs erection models sometimes are built to assist in solving rigging and other construction problems. Still another phase of the program is the preparation of standard models of typical process equipment.

1. Preliminary model . . . In the preliminary model, an example of which is shown in Fig. 1, arrangement of equipment is the primary aim. All equipment is approximate in its overall dimensions and most of the detail is lacking; i.e., a heater may be just a block of wood of the proper shape.

Due to the complexity of the modern refinery, the three-dimensional view provided has been found to be a great timesaver in arriving at the proper plot plan. Vertical clearances as well as horizontal are readily shown. This permits better design of equipment-handling facilities, such as the trolley beams and tube-bundle handling equipment in heat-exchanger structures.

Other major points readily established by the preliminary model include the accessibility of equipment for operation and maintenance, future expansion possibilities, and provisions for transportation facilities. They can be determined merely by shifting the models around, eliminating many wasted hours of changing and redrawing in the drafting room.

2. Structural model . . . The next step is to develop the preliminary model into a structural model—something that offers a good representation of what the finished plant will look like, with the exception of piping (see Fig. 2).

At this stage most of the equipment is firm. Thus necessary revisions are made to the pieces used in the structural model, including the addition of stairwell systems to structures, ladders and platforms to columns and vessels, and other pertinent structural details. Principal pipe supports are added, structural bracing is shown, and perhaps some of the major piping is included. In this model, as in the preliminary one, piping may be indicated by copper wires, which will be replaced by scaled piping in the final model.

On this model, structural designers can study their bracing systems to much better advantage than is possible on the drafting table. Piping and electrical draftsmen likewise benefit greatly. Where formerly it was necessary for them to study 25 or 30 drawings to become acquainted with a structure, they now can study the scale model and use the structural drawings merely as reference for clearances.

Ease of maintenance, or "serviceability," of the various pieces of equipment also are studied to make sure proper clearances have been provided.

3. Piping model . . . In the final model all piping is made to scale, and other details added which heretofore were considered refinements (see Fig. 3). Primary operating valves are added, including control-valve hookups, relief valves, and float-operated controls.

It is on this model that Fluor designers strive to achieve optimum operability. Through studying the model they can ascertain that valves, float-control mechanisms, and other instrument controls can be readily reached by the operator from the ground or walkways.

4. Standard models . . . A new, long-term project of the model department is the construction of typical installations such as fractionating columns, storage tanks, loading racks and oil heaters. These models will show in detail all piping, instrumentation, etc. With these standard models available, operators can study them in advance to see just what type of hookup would be used.

Typical of this program is the model oil heater shown in Fig. 4. Individual colors are used to identify each piping system. While the model represents only one method of how the heater could be hooked up, it is more than just another solution.

Before the model was designed and built, a detailed study was made of the possible piping methods. It involved visits to several refineries to talk with supervisors and plant operators, learning what mistakes had been made in installed heaters and obtaining their opinions as to which methods would be the best.

READING FOR PROFIT

JOURNAL CHECK CHART

What Is This Equipment?

THE equipment pictured below is found in a Kansas refinery. However, it could be adapted for a number of plant or field processing applications.

Can you identify it? Check the answer in one of the squares below, then turn to page 120 to check yourself.

- ☐ Pressure-relief valve on plant gas system manifold.
- ☐ Caustic mixing tank for treating operations.
- ☐ Sample point on product stream from cat cracking operations.
- ☐ Packingless booster pump in motor-fuel line from refinery tankage.
- ☐ Pressure transmitter used in automatic control setup.

DU PONT
REG. U.S. PAT. OFF.

PETROLEUM CHEMICALS DIVISION

NEWS

DU PONT
REG. U.S. PAT. OFF.

July ★ *One of a Series of Interest to the Petroleum Industry* ★ *1953*

Next Du Pont Gasoline Survey To Be Mailed On July 24

Results of the latest Du Pont Quarterly Motor Gasoline Survey will be mailed to refiners on Friday, July 24.

These surveys furnish current data on octane numbers and TEL content of motor fuels marketed throughout the United States.

Refiners have found the Du Pont Gasoline Survey to be valuable for indicating trends and competitive standings. And there are many who also use it as an aid to their marketing programs.

When the customer says

It's RARELY the fault of the gasoline!

The above headline and cartoon have been reproduced directly from a folder recently put out by Du Pont. Its purpose is to prompt your dealers on how to cope with a common—but often hard-to-answer—customer complaint.

"How many miles to the gallon?" is a familiar measure of both engine and fuel performance. Yet, ever since the gasoline engine first came into popular use, this method of measurement has been frequently misunderstood and misinterpreted. As a result, the gasoline dealer and the oil company he represents are often maligned.

In most cases where a customer complains to a gasoline dealer about poor mileage, improper car maintenance or erratic driving habits rather than gasoline quality are to blame. But service station men are sometimes hard put to explain this to the customer's satisfaction.

The new Du Pont folder makes it easier for your dealers to answer the complaint by serving as a constant reminder of all the mechanical and human factors that contribute to poor gasoline mileage . . . such as dirty spark plugs, a plugged muffler, or accelerator pumping. It quickly pinpoints these factors in concise, easy-to-understand language. There are no long, involved explanations. Simple line cartoons make many of the points graphically clear.

This new folder, "*When the customer says 'poor mileage,'*" is an appropriate sequel to a previous Du Pont folder, "*When the customer says 'knock.'*" The "knock" folder has been extremely popular among oil companies and dealers who have, to date, requested more than 200,000 copies of it.

For sample copies and information on how to obtain the "poor mileage" folders for your dealers, write to any of the Du Pont Petroleum Chemicals Division district offices.

Du Pont Engineering Services Help Refiners Achieve More Efficient Blending Plant Design and Operation

The use and safe handling of tetraethyl lead are highly specialized operations which frequently give rise to some rather knotty refinery problems.

To help refiners solve these problems economically and efficiently, the Du Pont Petroleum Chemicals Division offers special engineering services in blending plant design, construction and operation. This assistance covers every phase of the subject from site selection to training of blending plant personnel.

TO HELP YOU set up efficient TEL blending plant operations, Du Pont will supply you with complete construction drawings and detailed specifications.

After years of study and experience, Du Pont engineers have been able to set up standardized recommendations for plant design and operating procedures. Large refineries generally find these useful supplements to the work of their own engineering departments.

To the small refinery, these recommendations are often extremely valuable as a basis for setting up the entire blending operation.

Since the plant designs are drawn to standard specifications, they may not always solve a particular problem. Therefore, Du Pont is prepared to offer advisory help in tailoring standard designs to fit individual circumstances.

SELECTING THE SITE

Railroad, pipeline and storage facilities, as well as the relative position of refinery units, all have a bearing on the location you choose for a blending

ADVERTISEMENT—Prepared for the Petroleum Chemicals Division of E. I. du Pont de Nemours & Company (Inc.)

OVER

DU PONT

PETROLEUM CHEMICALS DIVISION
NEWS

DU PONT

CONTINUED *Engineering Services*

plant. Soil conditions, local code requirements and availability of materials must also be considered. Based on a wide variety of experience in dealing with these factors, the Du Pont engineering service men are prepared to help pick a blending plant site most advantageous to you.

PLANT DESIGN

Complete construction plans for TEL blending plants are available to all refiners. When necessary, Du Pont engineers will be glad to discuss special designs to meet unusual requirements. For example, Du Pont recently helped a large user design a special piling arrangement to support a blending plant on swampy land.

Today, many of the larger refineries are setting up facilities for continuous component blending of refinery stocks, tetraethyl lead, dyes, antioxidants and other additives. If you are considering such a plant, our engineering service men can assist your own engineers on the design.

Even after the actual construction has started, a Du Pont representative is available for consultation. And he will be glad to visit the job to discuss progress with your contractor whenever needed.

PERSONNEL TRAINING

To insure the health and safety of blending plant personnel, a specialized training program is required. Du Pont representatives are prepared to provide complete, detailed recommendations for safe and efficient operation of the blending unit and to assist with the actual training of operators. Also, a member of the Du Pont medical staff will explain the health hazards involved and outline the precautions which should be observed.

DU PONT REPRESENTATIVE (right) demonstrating proper use of tank cleaning safety equipment to refinery personnel.

EASTERN DISTRICT MANAGER

ALFRED R. MULLIS is manager of the Du Pont Petroleum Chemicals Division Eastern District. His first association with the petroleum industry began in the Smackover Oil Fields at the age of 10. His first refinery experience was at a large Gulf Coast refinery during the summer months, while attending college.

In 1938 he graduated from Rice Institute, and received a B.S. degree in chemical engineering. Following graduation, he was employed in the Research and Development Department of the Humble Oil and Refining Company.

During World War II, Mr. Mullis spent four years in the Navy and was attached to the Bureau of Ships as a Petroleum Inspector. In 1946 he resumed his association with the Humble Oil Company in the Petroleum Inspection Department.

Mr. Mullis joined the Du Pont Company in 1947 as a sales-service representative for the Petroleum Chemicals Division. He was assigned to the Gulf Coast District and became manager of this district in 1950. In 1952 he was transferred to New York City to his present position as eastern district manager.

Three Important Considerations Relating To Du Pont Fuel Oil Additive No. 2

1. Have you been receiving customer complaints regarding plugged filters or other stoppage of fuel oil systems due to sediment formed in the fuel? To prevent these conditions, Du Pont Fuel Oil Additive No. 2 not only retards the formation of insoluble residues, but also reduces the particle size of the residues that are formed. The cost of this treatment is only 1.6¢ per barrel, or less.

2. If you are now marketing only a straight-run fuel oil, the use of Fuel Oil Additive No. 2 will enable you to blend your present product with catalytic-cracked stocks of the proper boiling range without fear of causing clogged fuel systems. Marketing the blend will permit you greater flexibility to meet peak seasonal demands, increased yield of domestic heating oil and release of straight-run stocks for sale as premium diesel fuel or for use as charging stock.

3. If you are presently using a fuel oil additive, the chances are you can obtain the same end results, or even better performance, at lower cost with Fuel Oil Additive No. 2. And, from the standpoint of freight costs, the high active ingredient content of Du Pont Fuel Oil Additive No. 2 is a further advantage.

Samples for testing in your own stocks as well as a booklet describing the properties, applications and performance of Fuel Oil Additive No. 2 are ready for you. Ask any Du Pont Petroleum Chemicals Division representative or address your request to one of the district offices listed below.

DU PONT

Better Things for Better Living
. . . through Chemistry

Petroleum Chemicals

E. I. DU PONT DE NEMOURS & COMPANY (INC.)
Petroleum Chemicals Division • Wilmington 98, Delaware

District Offices:

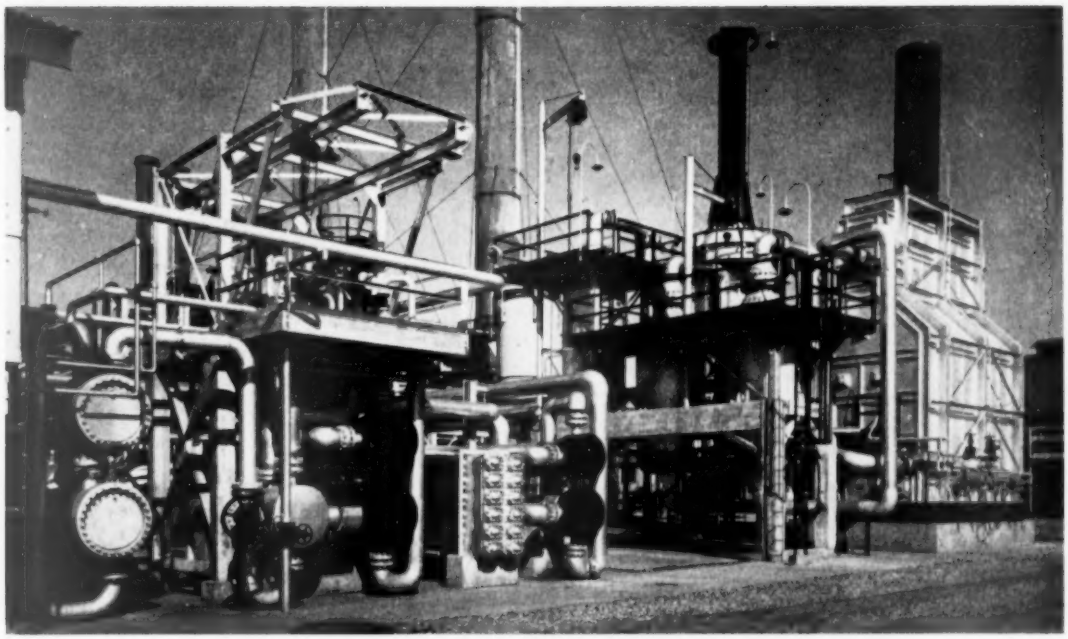
NEW YORK, N. Y.—1270 Ave. of the Americas	Phone COlumbus 5-3620
CHICAGO, ILL.—8 So. Michigan Blvd.	Phone RAndolph 6-8630
TULSA, OKLA.—1811 So. Baltimore Avenue	Phone TUlsa 5-5578
HOUSTON, TEXAS—705 Bank of Commerce Bldg.	Phone PReston 2857
LOS ANGELES, CALIF.—612 So. Flower St.	Phone MAdison 1691

IN CANADA: Canadian Industries Limited—Toronto, Ont.—Montreal, Que.—Calgary, Alta.

ADVERTISEMENT—Prepared for the Petroleum Chemicals Division of E. I. du Pont de Nemours & Company (Inc.)

A-5638

Printed in U. S. A.



ATLAS PLATFORMING UNIT shows, left to right, exchanger section, reactors, and intermediate heater.

Atlas gasoline-upgrading plant produces

Better-Than-Nitration-Grade Benzene

This is a report on the operation of the first gasoline processing plant of its kind. The unusually high content of naturally occurring benzene (3.5 per cent) in the raw 400° F. end-point naphtha feed stock was a surprising discovery resulting from Atlas research work.

This development led to the installation of benzene recovery and Platforming facilities. Benzene recovery has been 97 to 99 per cent since operations started in August 1952.

Product purity is very high, the boiling range averaging about 0.3 to 0.4 C. Atlas benzene thus meets specifications for research use.

ATLAS PROCESSING CO., located at Shreveport, has until recently been primarily a gasoline-upgrading plant. Most of its charge stock comes from the Carthage, Tex., area some 40 miles away. This raw charge is the 400° F. end-point naphtha extracted from natural gas of the large Carthage gas field. This material contains practically no sulfur or olefins; however, it does contain from 3 to 4 per cent by volume of naturally occurring benzene.

The Atlas company, in August 1952, completed facilities for the recovery of this benzene and is believed to be the largest producer of naturally occurring benzene. The benzene-recovery plant, operated under license from Shell Development Co., is an extractive distillation unit which uses phenol as the extracting solvent. Hudson Engineering Corp. constructed the unit which is designed for a raw naphtha charge of 15,000 bbl. per day with recovery of 21,500 gal. per day of nitration-grade benzene.

Because of the absence of cracked materials and sulfur, with efficient processing equipment and close control, benzene produced is of high purity and requires no treatment such as acid washing, caustic washing, and dehydration. Benzene recovery has been 97 to 99 per cent at all times. Typical characteristics of benzene produced are given in Table 1, although an even higher quality benzene can be produced if desired.

Platforming . . . Concurrent with completion of the new benzene-recovery facilities, Atlas also has added a Platforming unit to augment its older gasoline-upgrading units which use thermal reforming followed by catalytic gas polymerization for octane-number improvement. The older facilities were acquired on January 1, 1950, by the purchase of the crude-oil refinery from Atlas Oil & Refining Corp. These facilities have been largely converted for gasoline upgrading. The new Platforming unit is operated under license from Universal Oil Products Co. and was constructed by Procon, Inc.

Atlas Processing Co. is unique in that it carries on its operations for the various owners of the raw charge stock on a fee per barrel basis, returning upgraded products to the feedstock suppliers. The plant is located on a 180-acre plot at the western edge

for in or out bulk liquid storage

In 5 great markets General American offers you complete bulk liquid storage terminal facilities with no capital investment on your part.

You use modern facilities, pipelines, manifolds, blending equipment.

You have complete privacy.

All methods of bulk liquid transportation available.

At the Ports of New York and New Orleans there is high-speed canning, drumming and barrelling equipment—yours to use.

use General American's "for lease" facilities at Port of New Orleans

New Orleans, one of the largest southern ports in America, handles via ocean-borne tanker traffic 250.1 million lb. of bulk liquids every month.

for dependability, see GENERAL AMERICAN

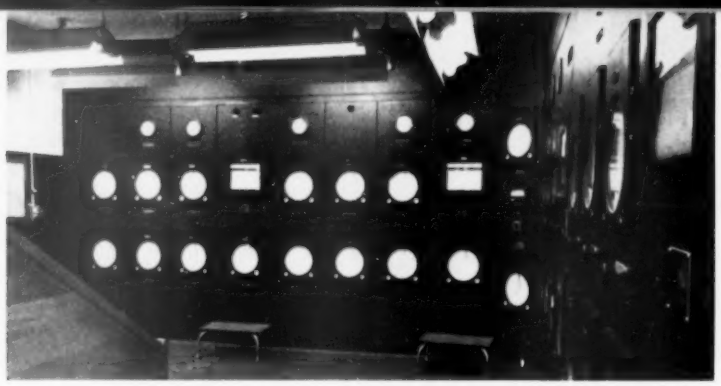
5 TANK STORAGE TERMINALS

in Important Marketing Centers

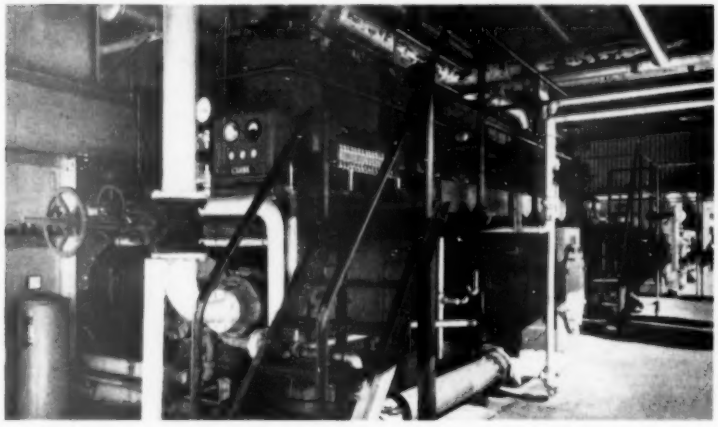
- Port of New York (Carteret, N. J.)
- Port of New Orleans (Goodhope, La.)
- Chicago
- Houston
- Corpus Christi

GENERAL AMERICAN TANK STORAGE TERMINALS

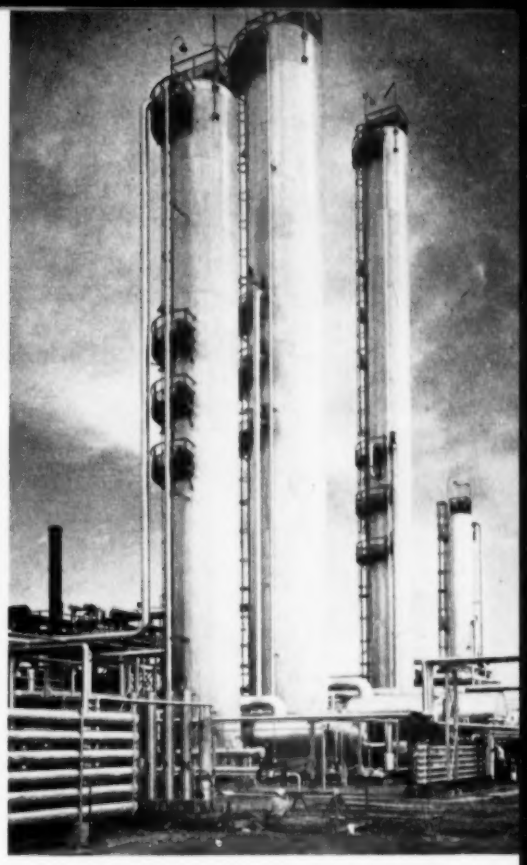
a division of General American Transportation Corporation
135 South La Salle Street, Chicago 90, Illinois



INSTRUMENT PANEL of the benzene-recovery plant.



GAS-ENGINE-END of compressors: Platforming unit.



BENZENE RECOVERY PLANT includes four distillation and stripping columns.

of Shreveport with room for future expansion.

Benzene-Recovery Plant

The benzene-recovery unit consists of a series of four fractionators and auxiliary equipment. The first fractionator with 40 trays acts as a depentanizer for the removal overhead of lighter hydrocarbons which would dilute the benzene concentrate. In the second column with 65 trays, benzene concentrate is removed as the overhead fraction. This fraction boils between 140° and 185° F. and contains approximately 16.0 liquid volume per cent of benzene compared with approximately 3.5 per cent benzene in the raw feed.

Benzene concentrate is the feed for

TABLE 1—COMPARISON OF CHARACTERISTICS OF ATLAS NITRATION GRADE BENZENE AND A.S.T.M. SPECIFICATIONS FOR NITRATION BENZENE

	Specifications for nitration grade benzene A.S.T.M.-D-835-47	Atlas nitration grade benzene
Specific gravity	0.8820 to 0.8860	0.884
Color	Not darker than a solution of 0.0030g of $K_2CR_2O_7$ in 1 L of water	Passes
Total distillation range at 760 mm pressure, for any one sample	Not more than 1° C., including the temperature of 80.1° C.	0.3° to 0.4° C. including the temperature 80.1° C.
Solidifying point	Not lower than 4.85° C. (anhydrous basis)	5.40
Acid wash color	Not darker than No. 2 color standard	0 to 1
Acidity	No free acid; that is, no evidence of acidity	Passes
Sulfur compounds	Free of H_2S and SO_2	Passes
Copper corrosion	Copper strip shall not show iridescence nor a gray or black deposit or discoloration	Passes

TABLE 2—MATERIAL BALANCE—BENZENE-RECOVERY-PLANT TEST RUN

Stock—	°A.P.I.	Lb./bbl.	B./D.	L.V. %	Lb./day	Wt. %	L.V. % benzene	B./D. benzene
Raw charge	71.2	244.1	15,024.3	100.00	3,667,440	100.00	3.362	505.2
Yields:								
C-1 overhead	95.3	218.1	4,699.7	31.28	1,025,149	27.95	0.138	6.5
C-2 bottoms	60.5	257.6	7,252.7	48.27	1,868,523	50.95	0.059	4.3
C-3 overhead	79.1	234.9	2,524.0	16.80	592,970	16.17	0.0236	0.6
C-4 overhead (benzene)	28.5	309.3	495.3	3.30	153,207	4.18	99.7	493.8
Loss and out of balance			52.6	0.35	27,591	0.75		
Total			15,024.3	100.00	3,667,440	100.00		505.2

Note that the four fractionators of the benzene-recovery plant are referred to as Columns C-1, C-2, C-3, and C-4 in this table. This designation is continued in Table 3. Also see simplified flow diagram, Fig. 1.

the third column where the extractive distillation step is carried out. This column has a total of 70 trays with 50 in the extractive distillation section and 20 in the phenol knockback section. The purpose of the phenol is to increase the volatility of the nonaromatic components relative to benzene so that nonaromatic compounds which normally form azeotropes with benzene can be separated by distillation. The column bottom product consists of a mixture of phenol and benzene, the nonaromatic portion of the feed going overhead.

In the fourth column, which has 30 trays, benzene is distilled overhead and phenol is drawn off the bottom and returned continuously to the extractive distillation column. Due to feed purity, little phenol sludging occurs and phenol consumption is less than 200 lb. per day including fractionation losses which are less than 50 lb. per day. With improvements in sludge reclaiming, phenol losses are expected to drop below 100 lb. per day. A simplified flow diagram of Atlas operations is shown in Fig. 1. A material balance of a test run operation is shown in Table 2. Typical laboratory tests are given in Table 3.

Hot oil is the heat medium used for reboiling each of the four fractionators. All equipment is operated at low pressure, the four fractionators operating in the range of atmospheric up to 40 psig. Fractionators and trays are of carbon steel, although reboiler bundles in contact with boiling phenol are constructed of 18-8 stainless steel. Valves in the phenol system have 18-8 stainless trim and phenol system pumps are alloy.

Platforming unit . . . The Platforming unit was designed to handle 4,400 bbl. per day of heavy naphtha charge and is now operating at capacity. As shown in the simplified flow diagram (Fig. 1), feed stock for this unit is the heavy naphtha produced from the bottom of the benzene concentrate column. Feed is first charged to the primary column which acts as a cleanup column. A small amount of bottoms is produced, and overhead material has a 30 Saybolt color. The overhead vapor is fed to the secondary column where the better octane portion is removed overhead and sent to gasoline.

Reactor feed is produced from the bottom of this column. Upgrading of this low-octane-number feed stock takes place in the reactor section. After passing through a charge heater, hydrogen gas is added to the feed which then passes through three reactors in series with intermediate heating between reactors. Catalyst life in the initial run was approximately 70 bbl. of naphtha throughput per pound of catalyst. This run began on July 26, 1952, and ended January 19, 1953.

Platformate specifications . . . After passing the reactor section, the effluent *(Turn to page 117)*

TABLE 3—LABORATORY TESTS—BENZENE-RECOVERY-PLANT TEST RUN

	Raw feed	C-1 overhead	C-1 bottoms	C-2 overhead	C-2 bottoms	C-3 overhead	C-4 overhead
Gravity, °A.P.I.	71.2	95.3	63.0	69.2	60.5	79.1	28.5
Distillation, A.S.T.M., °F.:							
I.b.p.	101	76	...	147	210	147	*79.99
10 per cent rec.	127	79	...	150	225	149	*80.15
50 per cent rec.	190	89	...	151	258	150	*80.16
90 per cent rec.	325	105	...	155	349	155	*80.21
D.p.		118	...	159		158	*80.25
E.p.	380	...	...	...	391	...	
Solid point, °C.	...	....	....	....	....	....	5.42
A.W. color	...	....	....	....	....	....	0-1
Corrosion	Neg.	....	....	....	....	....	O.K.
Color	30	....	....	....	....	....	Pass
R.v.p.	9.0	21.1	....	....	....	5.4	....
Research octane number, clear	55.9	87.6	....	....	....	60.0	....
+3 cc. TEL	79.7	98.0	....	....	....	84.1	....
L.V. per cent benzene	3.40	0.138	....	16.68	0.059	0.0236	....
Wt. per cent phenol	....	....	....	....	....	0.0	0.0

*C-4 overhead distillation in °C.

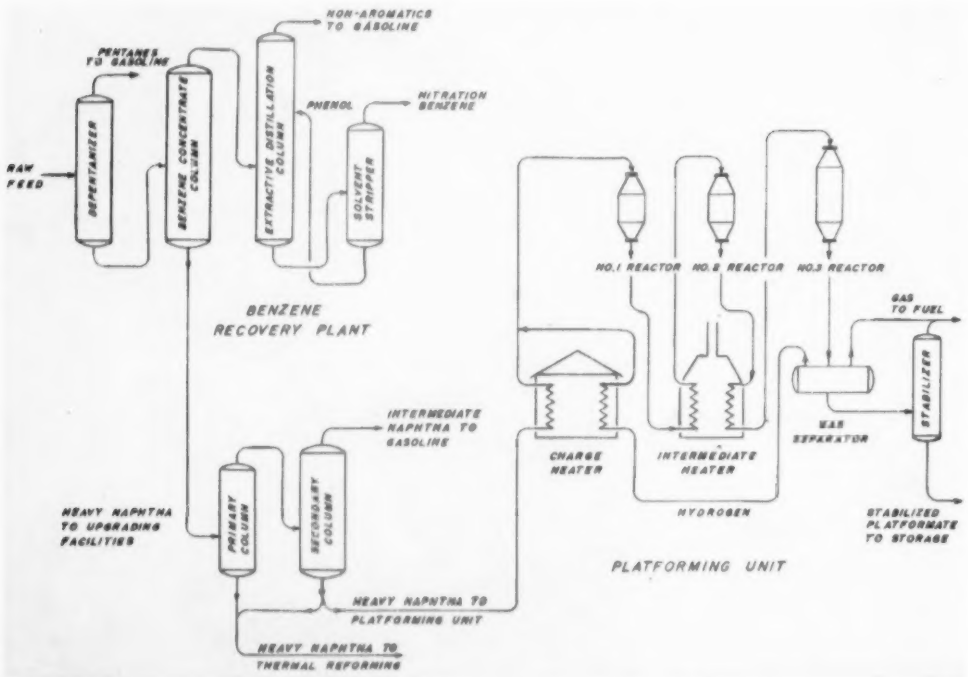


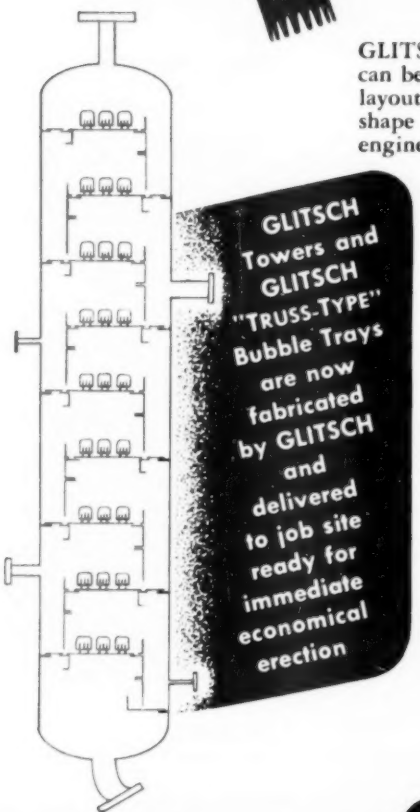
Fig. 1—Simplified flow diagram of Atlas Processing Co. plant.

DESIGN YOUR PROCESS REQUIREMENTS WITH COMPLETE FREEDOM OF LAYOUT

Glitsch CAN FABRICATE TO YOUR SPECIFICATIONS

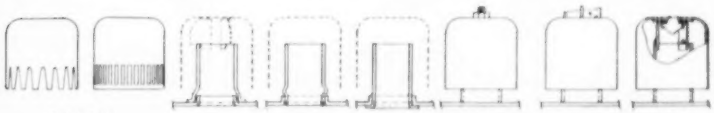
This is the *Glitsch* "TRUSS-TYPE" Mechanical Design

You specify your process requirements



GLITSCH Towers and GLITSCH "TRUSS-TYPE" Bubble Trays are now fabricated by GLITSCH and delivered to job site ready for immediate economical erection

GLITSCH "TRUSS-TYPE" lightweight trays, simple and adaptable in design, can be utilized for any process requirement with respect to tray size, process layout, type of flow, type and shape of downcomer, weirs, wells, and size and shape bubble caps as well as a suitable corrosion resistant material. Process engineers are not bound to standardized patterns. In collaboration with GLITSCH engineers, customers' management and engineering staffs can effect definite savings in initial designing while planning exact fabricated features desired.



...279 Cap and Riser Assembly Designs

Dies are available for 279 different cap and riser assemblies. Bubble cap styles can be furnished in a wide range of slots. Hold down styles simplify clean-outs, reduce "off-stream" time to a minimum.

Glitsch Service

World-wide service in initial planning, designing and fabrication of towers and internal equipment based on specific customer requirements, engineering surveys of existing facilities and cost analyses are promptly available.

Glitsch "TRUSS-TYPE" Bubble Trays, Towers and other Petroleum Refinery, Chemical and Industrial Equipment

Glitsch
FRITZ W. GLITSCH & SONS, INC.
P. O. Box 6227
DALLAS 2, TEXAS

SALES OFFICES:
NEW YORK CHICAGO
CLEVELAND TULSA
HOUSTON LOS ANGELES

NEW, Power-Packed AND READY TO GO!

NEW U-1091 natural gas power unit develops 187 net h.p. at 1400 rated r.p.m.; 200 net h.p. at 1600 max. r.p.m.; maximum torque, 820 lbs. ft. @ 800 r.p.m.

NEW U-450—102 net horsepower at 1800 rated r.p.m.; 110 @ 2200 r.p.m.; maximum torque, 324 lbs. ft. @ 1200 r.p.m.

NEW U-406—91 net horsepower at 1800 rated r.p.m.; 98 @ 2200 r.p.m.; maximum torque, 279 lbs. ft. @ 1200 r.p.m.

NEW U-372—83 net horsepower at 1800 rated r.p.m.; 91.5 @ 2200 r.p.m.; maximum torque, 263 lbs. ft. @ 1200 r.p.m.

NEW U-269—62 net horsepower at 1800 rated r.p.m.; 72 @ 2400 r.p.m.; maximum torque, 191 lbs. ft. @ 1200 r.p.m.

NEW U-240—55 net horsepower at 1800 rated r.p.m.; 64 @ 2400 r.p.m.; maximum torque, 168 lbs. ft. @ 1200 r.p.m.

NEW U-220—50.5 net horsepower at 1800 rated r.p.m; 62 @ 2400 r.p.m.; maximum torque, 151 lbs. ft. @ 1200 r.p.m.

IH Announces Seven New International Engines

Seven new six-cylinder, carbureted, valve-in-head engines have been added to the International line, which now includes 18 models—diesel, gasoline or gas—ranging from 16.5 to 200 net horsepower.

These new models are the result of more than 45 years of IH engineering and manufacturing experience building a complete line of heavy duty engines for tractors, trucks, construction and oil field equipment and individual power unit applications.

These new units have the durability, flexibility and economy to meet your requirements for lower cost performance. The unmatched network of IH district offices, parts depots, distributors and dealers puts complete service facilities practically at your door.

If you are an individual user of engines, it will pay you to see your nearest International Industrial Distributor or Power Unit Dealer for more complete information. If you are a manufacturer, your nearest IH district office will be glad to help you engineer these engines into the equipment you are building.

INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILL.

POWER THAT PAYS

INTERNATIONAL HARVESTER

INTERNATIONAL

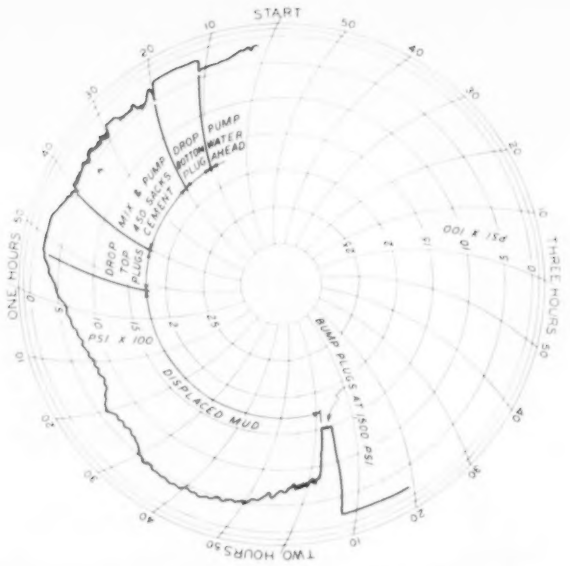


Chart 1—A cement-truck recording pressure chart made while cementing for an initial water shutoff using the move-and-scratch method.

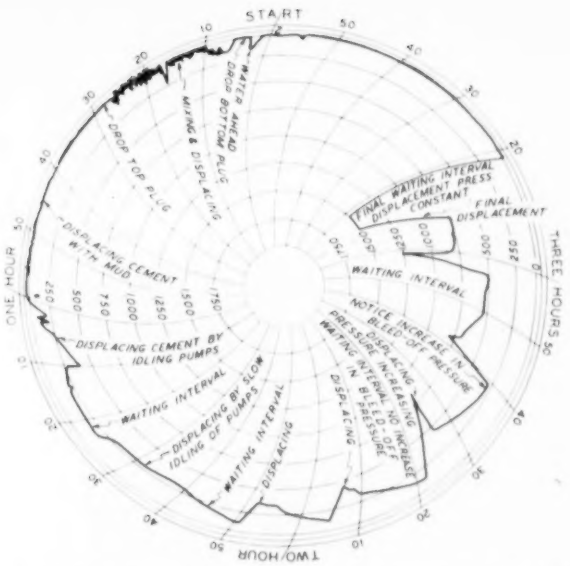


Chart 2—Note two methods of displacing the cement (a) idling and (b) slow pumping, and the relative increase in bleedoff pressure with displacement pressure being constant at 1,500 psi.

"Hesitation Squeeze" Cementing Technique

. . . as used in cementing casing for an initial water shutoff

by Carl B. Bowden*

A HESITATION-SQUEEZE cementing technique, developed in the Sansinena, California, oil field, is successful in increasing initial success on cement jobs from 25 to 88 per cent in slant-hole drilling. The method is applicable in many areas throughout the country.

The development procedure followed involved the comparison of the technique with the scratching method. First step in the investigation was to reciprocate the casing and scratch the wells to remove the mud cake before cementing. The first four wells at Sansinena were cemented in this manner and resulted in 75 per cent failure to shutoff water on the initial cement job. The average failure resulted in expenditure of 3.1 days' time and $3,951 in order to shut off the water.

The next 42 wells were cemented using the "hesitation squeeze" technique, which resulted in 12 per cent failure to obtain initial water shutoff. The average failure resulted in expenditure of 1.6 days' time and $2,129 in order to secure water shutoff.

The types of cement used in these operations had no apparent effect on obtaining an initial water shutoff. Thus, the hesitation-squeeze technique has been effective in reducing drilling cost not only by reducing the frequency of unsuccessful initial jobs, but also by decreasing expenditures for recementing operations where failures occur.

High final displacement pressures are significant in displacing the mud contaminated areas in the annulus with pumpable cement. This hesitation-squeeze technique is not recommended where depleted or lost-circulation zones are exposed to the cementing pressures.

Because of prevailing topography and existence of residential improvements, development of the Sansinena oil field in the northeast area of the Los Angeles Basin requires consolidation of surface locations of groups of wells into so-called island drill sites, and the drilling of slant holes to the oil productive formations. Many mechanical difficulties in drilling and casing the wells are presented. One problem, from the beginning, was that of obtaining an initial water shutoff. Failures appear to be due to the casing being uncentered in the hole, hole enlargement, low temperatures and geological conditions.

Drilling and Cementing Procedure

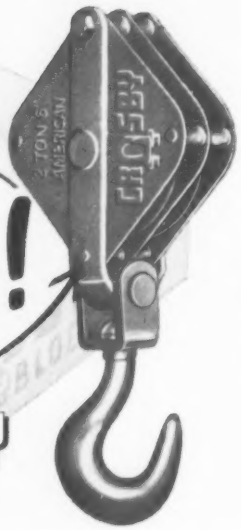
The hole conditions, the standard procedures of casing design and cementing are as follows.

Hole conditions . . . The wells are drilled with 10⅝-in. and 9⅞-in. bits using fresh-water, clay-base mud. Hole caliper logs indicate an enlarged diameter of 13 to 14 in. in the shale sections, while the diameter in sand sections approximates bit gage. The holes are deviated from 10° to 50° from vertical at the base of the interval to be cemented. Temperatures which are

*Union Oil Co. of California. Presented at spring meeting of Pacific Coast district, Division of Production, A.P.I., Los Angeles, June 1953.

Safer . . . because they're

Load-Rated!



AMERICAN CROSBY
WIRE ROPE BLOCKS

Safe working capacity embossed on side plate. Every block packaged.

MADE BY AMERICAN HOIST & DERRICK CO. • ST. PAUL 1, MINNESOTA

Authorized Distributors Everywhere

3301

MSCO® PELLENT...

NO MORE MOSQUITO BITES

No more lost time fighting mosquitoes, flies, chiggers, etc. . . . no more swatting around in dangerous quarters . . . no more itching welts to distract workers. An application of Pellent lasts at least *six hours* . . . costs less than 2¢. In handy *cream* form . . . no stickiness . . . doesn't come off easily with perspiration. Packaged exclusively by MSco under the Unit System to fit all standard unit type first aid kits. Six non-leaking tubes per Unit. Write for descriptive folder.

Medical Supply Company

"It pays to buy—from Medical Supply"

ROCKFORD, ILLINOIS • IN CANADA, IT'S SAFETY SUPPLY CO.

Making water work harder!

● Water alone won't work—it takes *soap* to get Butch really clean!

Today the soap industry is making water work harder than ever with new synthetic detergents of greater wetting and emulsifying power—even in hard water or acid solutions where soaps won't work.

As a matter of fact, 40% of the cleaning agents now in use are synthetic detergents. Over half of them are alkyl aryl sulfonates, known in practically every home in America by their short trade names such as Fab*. They're made from a combination of sulphuric acid and benzene-like oils which is then neutralized to form the non-corrosive sulfonate. ALOYCO valves made of Aloyco 20 and Inconel to withstand corrosiveness of the basic ingredients are widely used by the three leading firms in the soap field, as well as by other processors of synthetic detergents.

These harder working "soaps" represent only a small percentage of the many creations of modern chemistry that flow through ALOYCO corrosion-resistant valves during their processing. ALOYCO—in its engineering, research, testing and manufacturing has kept pace with the technical growth of the industries it serves. ALOYCO valves go hand-in-hand with chemical progress.

If your business involves chemical processing, write to ALOYCO about your own valve needs.

*Registered Trade mark Colgate-Palmolive-Peet Co.

ALLOY STEEL PRODUCTS CO., INC.
1314 West Elizabeth Avenue, Linden, N. J.

3.18

Longer Lasting
ALOYCO VALVES
1st in Corrosive Service

recorded by the electric log maximum temperature thermometer range from 112° to 164° F. with an average of 130° F.

Casing size and design . . . The casing string generally consisted of a 7-in.-diameter combination string with slotted perforations on the bottom, a whirler-type cement collar below which are two baskets 5 ft. apart, and a float collar one joint above the cement ports.

The scratchers were spaced 10 ft. apart on the float collar joint on the first four wells. Two centralizers were used to straddle the anticipated water shutoff test holes on the float collar joint in 37 out of 42 wells. The other five wells had centralizers located from 6 ft. to 33 ft. from the test holes and only one of these wells had a failure to secure initial water shutoff.

All wells were cemented using cement truck pumps. A minimum of 200 cu. ft. of water was pumped ahead of the cement using the top and bottom plug method.

Cement, primary job . . . An average of 300 sacks of cement is used on the primary cement job. "Slo" type cement was used on 11 wells during the early development. Twenty-three wells were cemented with construction-type cement; three wells were cemented with construction cement and an average of 10 per cent gel added; and 9 wells, out of the last 20, were cemented with 600 sacks of construction cement with light-weight aggregates and gel added. The present practice is to add 2 per cent calcium chloride to the first 100 sacks as an accelerator. The type of cement has no apparent effect on obtaining an initial water shutoff (refer to Table 1).

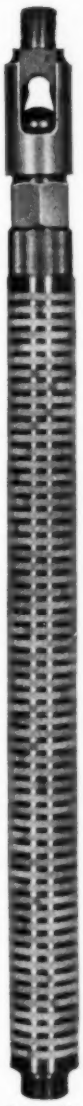
Move and scratch method . . . The procedure in cementing for an initial water shutoff on the first four wells is referred to in this report as the move and scratch method. The casing was run to bottom, reciprocated, and an attempt was made to remove the wall cake by scratching and circulating with large volumes of mud. The casing, due to lying on the low side of the hole, did not move freely while reciprocating. Thus, the walls were not scratched for as long a period of time as desired because of the danger of freezing the pipe. The cement was mixed and displaced with 0 to 500 psi. and the plugs bumped in a total of 30 to 45 minutes (refer to Chart 1).

The first well cemented in this manner had a successful initial cement job, the next three consecutive wells failed to secure water shutoff on initial cementing.

TABLE 1—EFFECTIVENESS OF CEMENTING METHODS, USING VARIOUS TYPES OF CEMENT

	Types of cement			
	"Slo"	Construction	Construction and gel	Construction and lt. wt. aggregate
Move and scratch method	3	1	...	...
Initial successful jobs	1	0	...	...
Per cent success	33	0	...	...
Initial failures	2	1	...	...
Per cent failures	66	100	...	...
Hesitation and squeeze method	8	22	3	9
Initial successful jobs	6	20	3	8
Per cent success	75	82	100	89
Initial failures	2	2	...	1
Per cent failure	25	18	...	11

Hesitation-squeeze technique . . . A different cementing technique was employed in displacing the initial cement on the next 42 wells, resulting in 37 successful jobs and 5 failures. It is referred to in this report as the hesita



Patent No. R-20574

ECONOMY DOLLARS!

So few can save so many!

For just a few dollars more
you can have a

MARTIN PLUNGER

1. It repairs for ⅓rd to ¼th the cost of a new plunger.
2. Lasts for years.
3. Gives longer runs and therefore less pulling cost.
4. Saves 50% to 80% on barrel or tube cost.
5. Increases production in many cases.

Our 1953 Catalog explains the simple requirements for getting these results. Just drop us a line for a copy.

Sold thru supply companies
Field Representatives (Manufacturers Agents):

E. W. Brockman, Tulsa, Okla., Phone 7-7477
H. G. Crider, Ardmore, Okla., Phone 2941
J. L. Davis, Houston, Tex., Phone MO-4891
Tom (W. D.) Hulett, El Dorado, Ark., Phone 3-4545
John B. Leland, Wheatridge, Colo., Phone Arvada 489R
Red (L. K.) Martin, Corpus Chrsiti, Tex., Phone 2-5317

JOHN N. MARTIN
MANUFACTURER
9 W. Brady St., Tulsa, Okla. **Tel. 4-9415**

tion-squeeze technique and is similar to stage squeeze cementing through a shoe-squeeze tool on drill pipe.

The casing is run to bottom and the circulation broken. The cement is then pumped in at varying weights but is predominantly medium to heavy. Displacement is stopped within 300 linear feet of the float collar followed by a waiting period of usually 5 to 15 minutes. Pumping is again resumed for 20 or 30 linear feet, followed by another waiting period. This intermittent pumping continues until the cement cannot be further displaced due to the cement setting, bumping plugs or when surface returns of circulation are no longer evident. The total cementing time averages 1½ hours.

The waiting periods between displacements are varied within the range cited according to depths and temperatures, but the most important factors in determining this are the pump-down and bleed-off* pressures, after each stage of pumping. If a rapid increase of pump-down pressure occurs, the waiting time is shortened; if no increase of pressure occurs, the interval is lengthened. The increase in the bleed-off pressure after each stage will be relative to the increase in pump-down pressure. Displacement pressure is 0 to 500 psi. at the first stopping point. It then increases in increments of 50 to 200 psi. after each waiting period. A final pressure in excess of 1,000 psi. is desired; however, water shutoffs are obtained at less pressure.

*Bleed-off pressure refers to the slow decline of pressure during the waiting period after pumping the cement. This decrease in pressure is believed to occur when the annular fluid cement seeks equilibrium after displacement surges by the cementing pumps.

There are several variations in time and amounts pumped. One successful method is to displace the final cement by idling the cement truck pumps after the initial buildup pressure occurs. The pressure recorder chart on the cement truck is a useful tool in observing the time-pressure relationship (refer to Chart 2).

Theory . . . A high final pressure, as in squeeze cementing,[1] is significant, due to stage squeezing of fluid cement into the mud contaminated areas surrounding the gelled cement channels.

Channels of cement slurry, cement contaminated mud, and wall cake are present between the casing and the walls of the hole in any given cross-sectional area a short distance above the ports of the cement collar.[2]

These cement channels will gel because of dehydration, due to time, pressure, and temperature, and will make displacement by cement unlikely under steady pumping conditions. The effect of intermittent pumping of fresh cement, at a slow rate, helps to displace the mud contaminated areas with cement as plug flow is approached.[1] In stage cementing, the pumping continues until the fluid can no longer be pumped, the plugs bump, or surface returns of circulation stop. The contaminated areas are progressively replaced by good cement and this ultimately results in a greater cross-sectional area of competent cement in the annulus, thus decreasing avenues of fluid entry to the casing.

The Sansinena field has competent beds below the cement ports; hence, with basket protection immediately below, and circulation returns at the surface, it is reasonable to assume the cement is circulating upward. Investigations have not been made to determine that the volume pumped down equals the volume of circulation returned at the surface. There has been no reason to believe that the cement passed down around the baskets and into the perforations as no cement has been found in the perforations below the cementing collar.

If depleted or lost-circulation zones occur and are exposed below the cement ports, it is possible the cement will migrate downward to the lower pressure. Therefore, the use of this

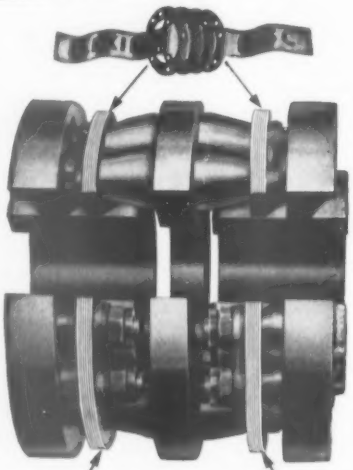
AVOID COSTLY SHUT-DOWNS!

DISTINCTIVE ADVANTAGES of THOMAS ALL-METAL COUPLINGS	
FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.

Specify THOMAS Flexible Couplings for Power Transmission

REFINERS! PIPE LINE MEN! DRILLING ENGINEERS! LABORATORY TECHNICIANS!

You can use Thomas Couplings to your advantage on Pumps, Compressors, Cooling Towers, Rigs or any other tough job where continuous operation and dependability are required.



Thomas Couplings are made for a wide range of speeds, horsepower and shaft sizes.

Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

Write for our new Engineering Catalog No. 51

THOMAS FLEXIBLE COUPLING COMPANY
WARREN, PENNSYLVANIA, U.S.A.

Announcing 3 new and improved organic dispersants by Magcobar

Alkatan-1:1

A powerful dispersing agent with a 1:1 alkali-tannin ratio. Field personnel are referring to Alkatan 1:1 as the MIRACLE BREAK-OVER CHEMICAL. Mud converted to a lime-treated system with Alkatan 1:1 does not exhibit the high viscosity hump so common to the normal caustic-quebracho conversions where each chemical is added separately. This results in a more rapid breakover, with a saving of valuable rig time.

Alkatan-1:2

This product contains 1 part alkali to 2 parts tannin. Superior treating may be expected with Alkatan 1:2 in MEDIUM AND LOW pH DRILLING MUDS. Exceptional results are also obtained in treating out cement and in combination with phosphates.

Emulsite

A mud conditioner for the preparation and stabilization of OIL EMULSION MUDS. Low pH emulsite muds are especially suited for work-over jobs, shallow wells, or where minor contamination from salt or anhydrite is expected. Emulsite also acts as a protective colloid and dispersing agent for muds in which no oil is used.

Look to Magcobar's experience and know-how for quality products. Magcobar's research chemists and engineers are constantly at work on ways to simplify and solve many of the oil industry's drilling problems. Wherever your rig is located, a Magcobar engineer is always on call, and Magcobar products are available through more than 350 dealers.

Magcobar
Complete
DRILLING MUD SERVICE
DEALER

Our Name is Mud!

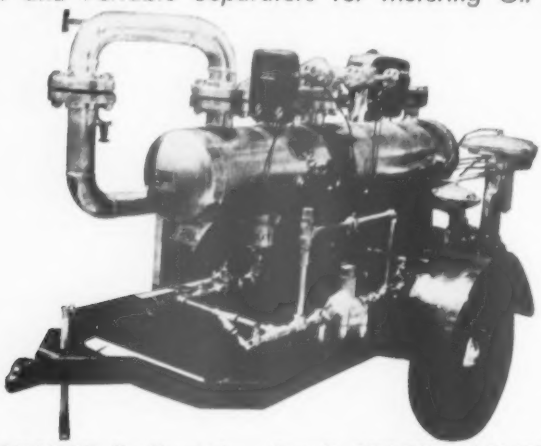
MAGNET COVE BARIUM CORPORATION

ONE OF THE DRESSER INDUSTRIES

MAGCOBAR • MAGCOGEL • HIGH YIELD • XACT CLAY • SALT GEL • MY-LO-JEL • MY-LO-JEL PRESERVATIVE • DRISCOSE FORM-A-PLUG • CELL-O-SEAL • FIBER SEAL • MAGCO FIBER • LEATHER-FLOC • MAGCO MICA • JEL-OIL MUD • JEL-OIL "E" • "E" CONCENTRATE • NOHEEV • TANNATHIN • RED OX LIQUID • ALKATAN • QUEBRACHO • KEMBREAK • MAGCOPHOS • CHEMICALS

ROLO WELLCHECKERS

Permanent and Portable Separators for Metering Oil and Gas



Rolo No. 12 H-1607 Trailer Mounted. Capacity 1000 BPD and 11,500 MCF gas.
Rolo Wellchecker No. 12 H-1607 has vessel 16" x 7' x 1200# w.p. code labeled, with 4" gas front, manual by-pass, automatic water knockout, special sample cocks and thermometer wells. Oil, gas and water are removed in separate lines, metered, and then recombined, if desired.
Made in all sizes to fit any operation, Rolo Wellcheckers are shipped with all controls, piping and accessories ready to operate. Rolo Wellcheckers enable the operator to check production daily and to secure accurate records for royalties and taxes. See Composite Catalog or write for illustrated bulletin.

Crude Oil Metering Specialists

ROLO MANUFACTURING COMPANY

P. O. BOX 6763, HOUSTON 5, TEXAS
BRANCHES: Corpus Christi, Midland, Kilgore, Tulsa, New Orleans, Los Angeles, Bakersfield, Casper, Calgary (Alta.)
Petroleum Industry Consultants, Apartado 3992, Caracas, Venezuela
EXPORT OFFICE: R. S. Stoykis & Sons, Inc., 17 Battery Place, New York, N. Y.

We Have The Answers TO YOUR PUMPING PROBLEMS

Every day the Viking sales and engineering staffs answer questions on pumping for a long list of satisfied customers.

Many are companies with problems very similar to yours.

These questions can be answered correctly because Viking people draw from over 40 years' successful pumping experience and recommend from the fastest-growing, most complete line of rotary pumps on the market. Over 600 standard models plus endless special designs. There's no compromise with Viking Pumps. We invite your questions on pumping problems.

For every type of service including field gathering, refinery pumping, pipeline coating, barge loading and unloading, oil sump pumping, LP-gas delivering, Diesel lube and fuel handling, there is a Viking built in the size and type required. Send for folder 53ST today.

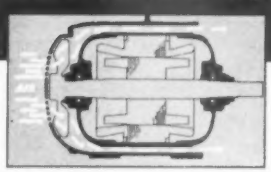
VIKING AN HONORED NAME IN PUMPING

See Our Catalog in SWEETS

VIKING PUMP COMPANY
CEDAR FALLS, IOWA

Let These MOTORS Do Your DIRTY WORK

They're built to ignore dirt, dust and corrosive vapors



SMITHway totally enclosed fan-cooled motor—a frame within a frame and both are cast iron. Efficient, high-capacity, double-locked fan forces air through self-cleaning ducts. Heat is dissipated—dirt, dust and corrosive vapors can't get into the sealed motor.

CAST IRON construction is one of the many outstanding features which makes these motors superior under service conditions involving dirt, dust and corrosion. Cast iron frame, cast iron end bells—the complete enclosure is cast iron—all exposed parts are cast iron. Ideal for petroleum, chemical and other rugged industrial applications.

SMITHway totally enclosed fan-cooled motors are built to standard NEMA frames to meet the highest standards of electrical performance. TEFC motors are built in sizes from 5 to 125 HP. Parts and service available throughout U.S.A. Get complete information from nearest office or write today.

SMITHway totally enclosed non-ventilated motor. Standard NEMA frames. Cast iron construction of all exposed parts keeps these motors, by the thousands, on the job regardless of dust, dirt and corrosive conditions. Available in ratings from 1 to 5 HP.

A.O.Smith
ELECTRIC MOTORS

5715 SMITHway St., Los Angeles 22, California
1000 Webster St., Dayton 4, Ohio • Offices in Principal Cities • International Division, Milwaukee 1

technique under such conditions is not recommended.

Drill out and water shutoff . . . The cement is allowed to stand a minimum of 14 hours in all wells, following which the cement is drilled out to within 15 ft. of the cement ports and the plug pressure tested.

The effectiveness of water shutoff is tested by a combination gun and tester by shooting test holes in a substantial shale body located as close to the cement ports as possible.

Geology at water shutoff point . . . The shale bodies above the producing zone in many wells have thin stringers of sand at 3 to 10-in. intervals, which may be water bearing. On occasion, the shale bodies may be fractured.

Discussion and Results

The move and scratch method was used to cement the first four wells and resulted in a successful job for the first well and failures for the next three (see data, Table 2). The test holes were shot 16 ft. to 40 ft. above the cementing ports and the fluid rises were 3,500, 2,700, and 400 ft. of water and oily mud in tests of failures. In the case of the 400-ft. rise, the tool plugged after a period of 15 minutes. There were eight separate squeeze jobs, eight tester runs and 9.2 days' elapsed time from when the test holes were shot until water shutoffs were demonstrated. This represents 3.1 lost days, an average cost of $3,951 per well where initial failure occurred and $2,963 per completed well cemented by the move and scratch method.

TABLE 2

Summary of Data Comparing Results of Two Methods of Cementing Casing for an Initial Water Shutoff

	Move and scratch	Hesitate and squeeze
Number of wells	4	42
Average time to mix and displace cement	(*)	(†)
Initial successful jobs	1	37
Per cent approved	25	88
Failures	3	5
Per cent failure	75	12
Total number squeeze jobs before water shutoff demonstrated	8	7
Squeeze jobs per initial failure	2.7	1.4
Total testers run	8	7
Retest per failure	2.7	1.4
Total lost time (days)	9.2	8.1
Lost time per failure (days)	3.1	1.6
Average lost time per completed well due to failure (days)	2.3	0.2
Average total cost per failure	$3,951	$2,129
Average total cost of failure per completed well	$2,963	$253

*30 minutes. †3 hours (1½ hours using 2 per cent calcium chloride).

The hesitation-squeeze technique was used to cement the casing on the next 42 wells (see data, Table 2). Thirty-seven were successful initial water shutoff jobs and five were initial failures. A series of 26 consecutive shutoffs was achieved. The five failures gave only 12 per cent failure as against 75 per cent using the move and scratch method. These five failures required seven squeeze jobs, seven tester runs and 8.1 days' elapsed time before water shutoffs were demonstrated. This resulted in an average of 1.6 days' lost time, and an average cost of $2,129 per well where failure occurred, and an average cost of $253 per completed well using hesitation-squeeze cementing method.

The hesitation-squeeze technique has lowered direct drilling cost because of (1) higher frequency of successful initial cement jobs to shut off water and, (2) reduced squeeze jobs and retest runs per failure in the initial cement job.

One of the unsuccessful jobs using the hesitation-squeeze method occurred because of too long a time period between pumping intervals, causing the cement to set up inside the casing before it could be squeezed out. Another was due to the final pressure being only 400 psi., 1½ hours after mixing, and the plugs bumped. An insufficient amount of cement was used on the third failure where only 75 sacks of cement were used. Two failures are unexplainable.

The displacing time interval has been reduced from an average of 3 hours to 1½ hours by using 2 per cent calcium chloride as an accelerator.

References

1. Howard, George C., and Fast, C. R., "Squeeze Cementing," Journal of Petroleum Technology, Feb. 1950.
2. Jones, P. H., and Berdine, Dennis, "Oil-Well Cementing Factors Influencing Bond Between Cement and Formation," A.P.I. Pacific Coast district, Mar. 19, 1940.
3. Howard, George C., and Clark, J. B., "Factors to Be Considered in Obtaining Proper Cementing of Casing," The Oil and Gas Journal, Nov. 11, 1948.

Better-Than-Nitration-Grade Benzene

(Continued from page 108)

stream goes through heat exchangers and coolers and enters the gas separator. Excess hydrogen-rich gas from the separator is sent to fuel. The separator liquid is stabilized to approximately 8.0 lb. R.v.p. A comparison of characteristics of charges and yields and yield data is given in Table 4.

It is interesting to note that the platformate is a premium fuel of 93 F-1 octane number which is produced in volumetric yield of 87.7 per cent from an unusually paraffinic charging stock. Hydrocarbon-type analyses of the reactor charge and of the stabilized platformate conclusively show that the increase in octane number is a result not only of the naphthene dehydrogenation, hydrocracking, and paraffin isomerization reactions but that dehydrocyclization of paraffins must also play a very substantial role.

The aromatic content of the platformate is considerably higher than would correspond to the complete conversion of all of the cyclics in the charging stock and these additional aromatics must have been made from paraffinic components of the stock.

The platformate has a low sulfur content in the order of 0.002 per cent by weight and is a completely stable fuel requiring no chemical treatment with the exception of the addition of a small amount of inhibitor. The low Saybolt color reflects the characteristic "bloom" of platformed gasoline which is the result of the presence of aromatics.

TABLE 4—YIELD AND STOCK CHARACTERISTICS—PLATFORMING UNIT OPERATIONS

	Charge to feed preparation	Naphtha bottoms	Intermediate naphtha	Reactor charge	Stabilized platformate
Gravity, °A.P.I.	60.4	47.7	66.0	59.4	59.4
A.S.T.M. distillation, °F.:					
I.b.p.	....	401	193	224	94
10 per cent rec.	....	416	197	243	146
50 per cent rec.	....	427	200	270	224
90 per cent rec.	....	456	209	338	326
End point	....	482	251	390	405
Per cent recovery	....	....	....	99.0	98.0
Color, Saybolt	....	14	30	30	17
R.v.p.	....	....	....	....	8.0
Research octane number (F-1), clear	....	....	51.0	20.0	78.5
+3 cc. TEL	....	....	76.0	60.0	93.0
Yield, L.V. per cent of reactor charge	....	....	....	100.0	87.7

Note: From 3 to 4 L.V. per cent of the reactor charge is recovered as excess butane from stabilizer gas.

New-design flare stack at Llandarcy.

SOMETHING NEW IN

FLARE STACKS

by Ted Armstrong

Special design is more economical of steel, and is ideally adapted to marshy location

UNUSUAL refinery flare stacks, the first of such design in the petroleum industry, have been placed in operation at the three major United Kingdom refineries of Anglo-Iranian Oil Co., Ltd.

The stacks, 2 ft. in diameter and 250 ft. high, are supported by guyed steel lattice masts 235 ft. high. In these installations, the entire assembly rests on a 2-in. ball bearing recessed equally between two steel plates, the lower of which is slightly convex.

Anglo-Iranian adopted the new design for two reasons: First, it is cheaper, since the new-type stack requires only two-thirds the amount of steel needed in a comparable self-supporting structure; second, the three refineries involved are on marshy sites where it would have been difficult to provide reliable foundations for unstayed towers.

Five such stacks have now been installed for Anglo-Iranian by British Insulated Callender's Constuction Co., Ltd., including two at Llandarcy, Wales; one at Grangemouth, Scotland; and two at the Isle of Grain, in the Thames Estuary.

Mast design . . . Construction of the supporting masts used principles employed in erecting tall British television towers.

Height of the stack was determined by the burning temperatures, as high as 1,000° F. during maximum discharge, which would prevent work within 350 ft. of the flame, which sometimes reaches a length of 50 ft. Diameter of the stack was based on a maximum rate of flow of waste gas from the catalytic cracking unit and other process units of 1.5 million cubic feet an hour.

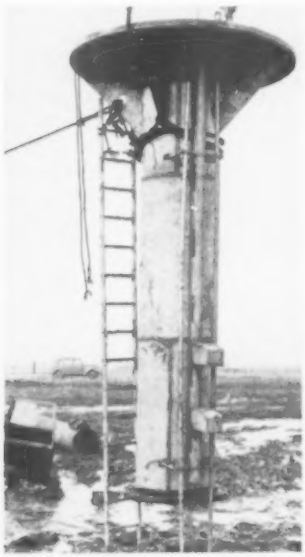
The mast is triangular with 6-ft. faces. Total weight of the mast is only 21 tons. Three stays are attached at the 174-ft. level and anchored in concrete at an angle of 53° from horizontal. While the company figured two sets of supporting guys would have been more economical, only the 174-ft. stays were used because it was expected that poor ground conditions might cause unequal settlement of the stay anchorages, creating damaging strains on the mast. The masts were designed to withstand a wind velocity of 75 m.p.h.

Stack design . . . Mild-steel pipe with a ⅜-in. wall thickness and made up of 25-ft. sections welded together after installation constitutes the flare stack. Total weight is about 11½ tons.

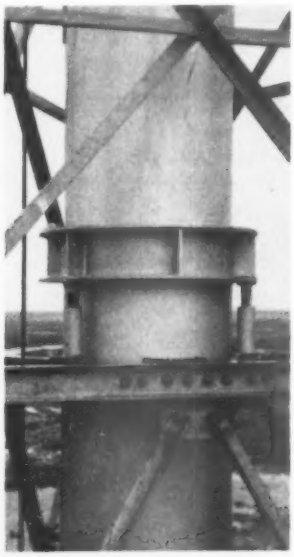
Centered in the triangular mast by horizontal frames, the stack is suspended by supports at the 205-ft. level. Reason for suspending the stack here was to limit to the top 45 ft. any

Ball bearing on which the mast supporting the flare stack rests. Note convex surface of steel plate in which ball is centered.

Isle of Grain installation during recent floods and just prior to its completion. Gas intake is on right side of stack just above bottom.



Flare tip with 5-ft. bell mouth which is bolted on top of a section containing the flame arrester. Tip is stainless steel.



Support which suspends the flare stack within the mast. Suspension limits the upward vertical expansion of the stack.

Expert financial counsel is a must
for the successful continuation of a business.
At The National Bank of Commerce officers actually work for each of our
industrial depositors, using their accumulated, specialized
financial experience to help you. This expert guidance is at your service when
you make The National Bank of Commerce the bank for your company.
So, keep your business riding smoothly by taking advantage
of the broad experience of The National Bank of Commerce of Houston.

THE NATIONAL BANK OF COMMERCE

OF HOUSTON

Gulf Building, Houston, Texas "The Bank for All the People"

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

thermal expansion affecting its height. Thermal expansion beneath the 205-ft. level is reflected downward.

Flange-bolted to the top of the stack is a 2-ft. section of stainless-steel-lined pipe containing the flame arrester. Bolted to this is the flare tip, an 11-ft. section of stainless-steel pipe which opens at the head into a bell mouth 5 ft., 8 in. across.

Waste gases are ignited by a constantly burning pilot flame in the mouth of the flare tip. An electrically operated flame-propagation tube is installed to relight the pilot in the event it is extinguished, and this unit is push-button operated from the refinery-control room.

Foundations . . . Varying ground conditions necessitated different types of foundations at the three refinery sites.

At Grangemouth it had been found that even piles driven to a depth of 80 ft. had failed to give reasonable bearing values. Here Anglo-Iranian used a reinforced-concrete raft 30 ft. square and 1 ft. thick as mast foundation. The raft has eight radial stiffening beams, 18 in. wide. These are 2½ ft. high at the center of the raft but taper to 1½ ft. at the end. Base dimensions of the stay anchorages were enlarged to compensate for the low bearing values.

On the Isle of Grain, Anglo-Iranian found that piles would give reasonable bearing values. Here the masts are set on bases consisting of four 45-ft. piles, 12 in. square, capped with a reinforced-concrete head.

At Llandarcy the ground is firm and conventional foundations were possible for both the masts and the stay anchorages.

Water Floodability

(Continued from page 99)

C. Flood-pot tests on California sands.

D. Completed gas-depletion pools east of California.

Completed California floods are almost nonexistent. Wasco field has been studied by this same committee.[8] The correlation point for this pool is plotted as shown in Fig. 5, without correction for conformance factor, which if known would have considerably lowered the oil saturation at a given viscosity ratio. If this conformance factor were, for instance, 50 per cent, the residual-oil saturation would have been 21 per cent, which is not in poor agreement with the water-drive pool curve described below. One reason for the high value may be the high initial oil saturation, which is a result of unusually low interstitial water for so deep a sand and so high a gravity of oil. Also, this pool will be abandoned at a pressure above 5,500 psi., because of the economic difficulty of pumping at 13,000-ft. depth.

Core-oil content obtained by coring pools known to be thoroughly watered out is another good source of pool residual-oil saturation, but the data are not numerous. This coring procedure may well not deplete the oil content below its formation value if as shown by negligible well production, the formation oil content is truly down to a residual value. Good examples of this type of data are shown as triangles on Fig. 1.

To substitute for the lacking completed California floods, there are given here the extensive data on 103 fields studied by the Special Study Committee on Allocation of Production and Well Spacing, A.P.I. Division of Production.[9] Of these fields, 69 are classified as water-drive pools, and the data from them are shown in Fig. 3 on which an average curve for "water-drive pools" is drawn.

It is significant that this curve (Fig. 3) is substantially parallel to the curve for the wire-line-oil saturation, but corresponds to high residual-oil values for a given viscosity ratio. This means that the California wire-line cores are more thoroughly flushed and depleted than are those pools east of California. It does not mean that California pools will be thus more thoroughly depleted, since herein no account has been taken of the conformance factor that should relate low residual saturation of flushed and depleted cores to average pool saturation at abandonment. The conformance factor that would on the average be required to make these data agree would be about 0.6, which may appear a little low, but not out of reason.

Fig. 4 shows another interesting comparison—that with the residual oil saturation curve representing 25 "gas-drive pools" from this same A.P.I. study of 103 fields. Again these data have not been corrected for the conformance factor to make them comparable to the core data, but again the parallelism to the other two curves is striking. These variations with the oil-water viscosity ratio tend to substantiate the choice of this parameter as the controlling one in the efficiency of oil recovery.

Fig. 5 shows a curve for the average residual-oil content of flood-pot test samples[10] drawn for comparison with the other data. Only the watered-out core data and the wire-line core data can be compared directly without involving the conformance factor. It is significant, however, that at the higher oil viscosities, the flood-pot data show lower residual oil than do the other methods of oil displacement.

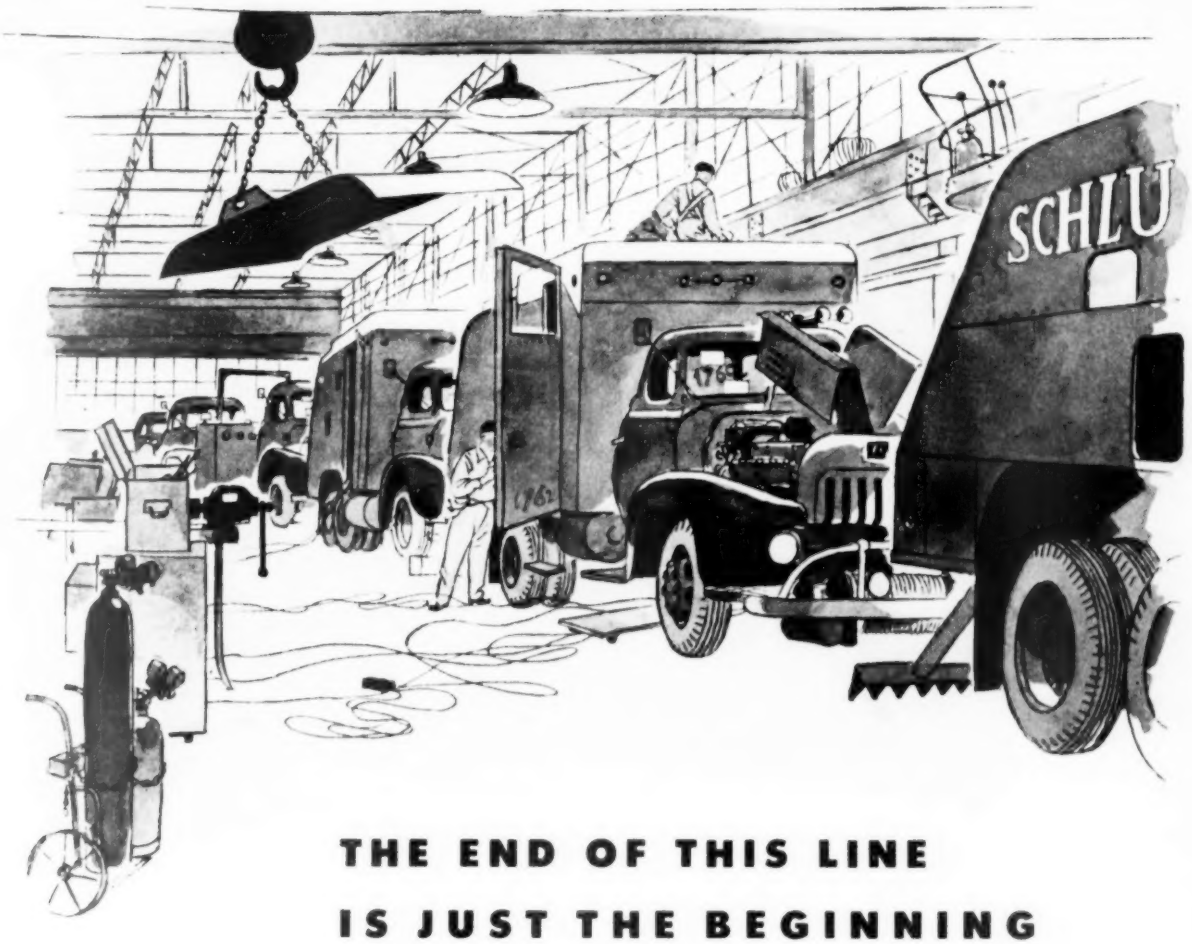
The flood-pot results are believed to give in this viscosity range a basic irreducible residual-oil saturation which, with judicious use of the conformance factor should give a reliable and realistic estimate of ultimate pool residual-oil saturation. As in the case of water-drive pools and gas-drive pools curves, the mean curve for the flood-pot evaluations has been drawn through a scatter of data. One of the reasons for scatter on this curve is the fact that initial oil saturations are quite variable, these flood-pot tests being run on raw cores as received at the laboratory. The flood-pot evaluations were carried out under conditions pertinent to each reservoir being studied; therefore, there is no good or valid reason why a common curve should exist. The curve on Fig. 5 is a generalized approximation drawn through a scatter of points. No reader should use this mean flood-pot curve to indicate an infallible flood residual for oil of his particular viscosity ratio. The result of such misuse of this average curve could often be economically disastrous.

References

1. J. J. Mullane, "Pressure Core Analysis," A.P.I. Drilling and Production Practice, 163 (1941).
2. H. G. Botset and M. Muskat, "Effect of Pressure Reduction Upon Core Saturation," Trans. A.I.M.E., 132, 172 (1939).
3. S. E. Buckley and M. C. Leverett, "Mechanism of Fluid Displacement in Sands," Trans. A.I.M.E., 146, 107 (1942).
4. W. A. Heath, "Influence of Viscosity of Crude Oil on Secondary Recovery," A.P.I. Secondary Recovery of Oil in the United States, second edition, 228 (1950).
5. H. Dykstra and R. L. Parsons, "The Prediction of Oil Recovery by Water Flood," A.P.I. Secondary Recovery of Oil on the United States, second edition (1950).
6. M. B. Standing, "A Pressure-Volume-Temperature Correlation for Mixtures of California Oils and Gases," A.P.I. Drilling and Production Practice, 275 (1947).
7. Carlton Beal, "The Viscosity of Air, Water, Natural Gas, Crude Oil and Its Associated Gases at Oil-Field Temperatures and Pressures," Trans. A.I.M.E., 94 (1946).
8. N. van Wingen, "Water-Drive Reservoir Performance, Vedder Pool, Wasco Field," A.P.I. Drilling and Production Practice, 361 (1951).
9. M. Muskat, Physical Principles of Oil Production, McGraw-Hill Book Co., 835-843, (1949).
10. Norris Johnston and N. van Wingen, "Recent Laboratory Investigations of Water Flooding in California," presented at annual meeting of Pet. Div., A.I.M.E. in Los Angeles, Feb. 14-19, 1953, Paper No. 263-G.

Answer to Check Chart

The puzzle picture appearing on page 102 of this issue is correctly identified as packingless booster pump on motor-fuel line from refinery tankage to products line.



THE END OF THIS LINE IS JUST THE BEGINNING

When a Schlumberger truck rolls off this production line in the new Headquarters at Houston, it is dispatched to one of more than ninety field branches in the United States and Canada. Each unit is equipped to provide uniformly fine service under all conditions wherever it operates.

SCHLUMBERGER

WELL SURVEYING CORPORATION — HOUSTON

ATLAS PROCESSING COMPANY at Shreveport, Louisiana, has recently placed in operation this Hudson-Built benzene recovery plant, the first to recover substantial quantities of natural benzene from liquid hydrocarbons extracted from natural gas. Over 98% of the benzene present in motor fuel base stocks produced in gas processing plants in the Carthage gas distillate field of East Texas is extracted in this unit. The benzene is nitration grade, having a purity of over 99.6%. Hudson is proud of its part in implementing the concept of the Atlas management in this pioneering operation.

HUDSON
ENGINEERING CORPORATION
FAIRVIEW STATION • HOUSTON, TEXAS

Appalachian Basin Reviving as

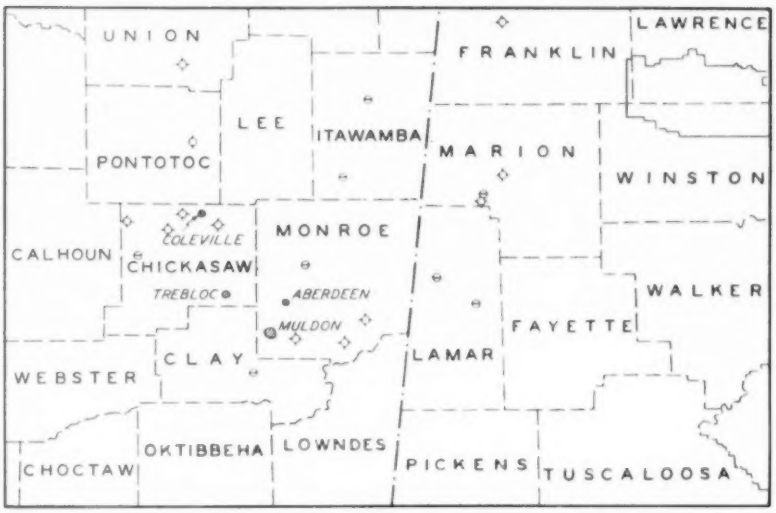


Fig. 1—Map of active portion of the Appalachian basin showing producing fields, drilling wells, and dry holes.

Active Exploratory Area

"Leasing was so feverish at intervals this spring that many oil-company scouts have spent most of their time 'bird-dogging' the activity."

by Jim D. Harvel

THE most intensive leasing and drilling campaign in the history of the Appalachain basin of northern Mississippi and Alabama is unfolding with a speed which may soon prove the basin to be an important oil and gas producer.

Since November 1951, when an old abandoned "dry" hole in Monroe County, Mississippi, blew out during rework operations, an estimated 1,500,000 acres have been leased by major and independent companies and speculators. Large amounts of new acreage are being recorded daily, with the play ranging from the Mississippi River in northwestern Mississippi to the eastern flank of the basin in Walker and Winston counties of northeastern Alabama.

Four gas or gas-distillate fields have been discovered in Mississippi since the play began, and a possible fifth field opener is testing through production casing at Carter Oil Co. 1 McFadden, in Section 36-16s-5e, Clay County. Since January 1952, 25 wells have been drilled below 2,000 ft., and 11 tests, 8 of them wildcats, are now being drilled.

Lease bonuses vary from 50 cents per acre for 10-year commercial leases with 25 to 50-cent rentals in the relatively unexplored parts of the basin, to $15 per acre with $1 rentals in the more competitive areas in and around Chickasaw and Monroe counties, Mississippi. Bankers and merchants of Aberdeen, county seat of Monroe County, conservatively estimate deposits and retail-business figures up 10 per cent, for their highest levels.

Geologically, the play is based primarily on Paleozoic-age rocks of the Pennsylvanian, Mississippian, and Devonian systems with emphasis on the Mississippian-Chester.

Initiation of Interest

The play was spurred by an unorthodox event, the reentering of a dry hole, drilled 10 years earlier. The play was sparked by the completion of Union Producing Co. et al 1 J. L. Sanders, a rank wildcat in Section 22-15s-6e, Monroe County, in February 1952. This discovery flowed at the rate of 35,000,000 cu. ft. of gas per day with 350 bbl. of 66.2°-gravity distillate from the Sanders sand, topped at 5,390 ft. in the Chester.

The original hole was a stratigraphic test drilled by Carter Oil Co. in 1941. It was completed as dry after logging what appeared to be noncommercial gas shows, and leases were surrendered. In October 1951 Northeast Mississippi Oil Co. et al began rework on the hole which was leaking and burning a small amount of gas. When cleanout work had progressed to approximately 2,900 ft. the well blew out, and the tubing was dropped in the hole. After several weeks of painstaking cleanout and fishing operations, 5½-in. casing was set at 5,186 ft., and the well completed as the discovery of Muldon field, named after a nearby community.

Carter immediately began reassembling many of its old prospects, and 10 or more major companies joined in. Little subsurface information from drilled wells was available to guide geologists, with the first result being a large land play, and the second bringing the sector's greatest concentration of geophysical crews. Seismic reflection was the most-used exploratory tool.

Leasing Activity

Thus was launched the beginning of the solution to the Mississippi-Alabama Appalachian basin problem: Reduction of general information to the particular. Drilling wells are adding daily to the particular and are extending the basin more into the realm of the subsurface geologist. To date leasing activity in northern Mississippi has been based largely on the seismic computer's work and on land plays.

Leasing spread steadily from the focal point at Muldon field until Chickasaw and Monroe counties were virtually completely leased. Except for Federal Land Bank and federal lands these counties were leased at average price of $5 and $10 per acre for 10-year leases. Much of the Land Bank acreage was leased for a bonus of $1 per acre during the early part of the leasing, and federal land in some instances was almost as cheap.

Leasing was so feverish at intervals this spring that many oil company scouts headquartered in Jackson, Miss., have spent most of their time "bird-dogging" the activity. Some companies have kept scouts on the ground for a month at a time and substituted geologists for them at the scout's weekly check meeting.

Leasing has spread primarily northwestward up the basin to the counties adjoining the Mississippi River, with many large blocks and checkerboard spreads being taken. Leases in this territory are being taken on gravimeter and magnetometer mapping, with

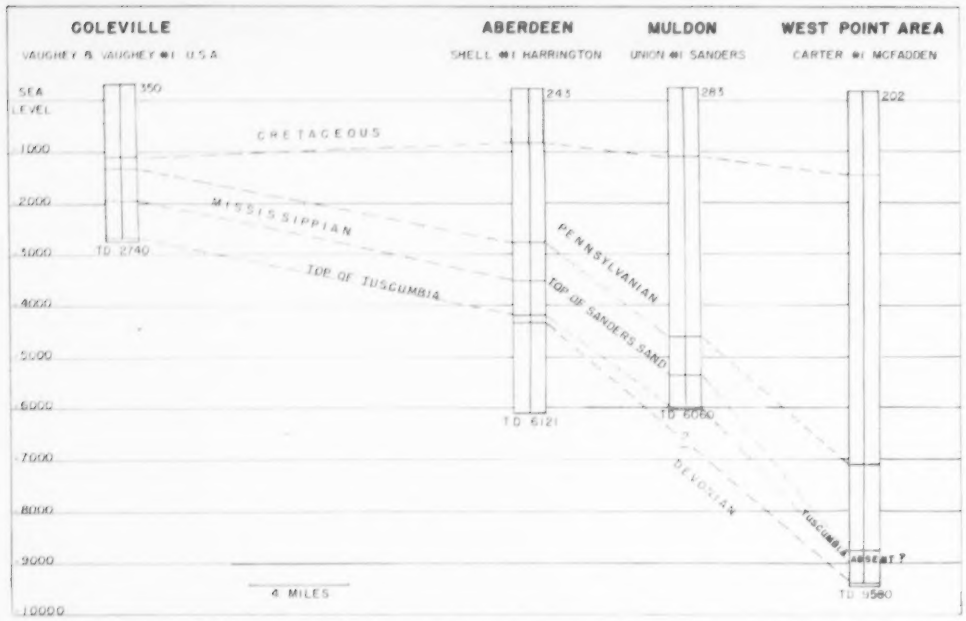


Fig. 2—Cross-section showing steep dip between Aberdeen field and the West Point area in Black Warrior basin.

few subsurface holes to yield information and practically no seismographing.

Producing Wells

Productive gains accounted for in the last 18 months include four fields on the Mississippi side with a probable fifth field opener testing.

At Muldon, Union has finaled two more gas-distillate wells, one potentialing 32,000,000 cu. ft. of gas per day and the other 11,000,000 cu. ft. of gas per day. The company is drilling two more tests on a 320-acre spacing plan and has but one dry hole (on the north side of the field.)

Early this year Carter discovered Trebloc field at 1 Baskin heirs, in Section 19-14s-5e, Chickasaw County, in the Carter sand at 4,290 ft. This well had an open-flow potential of 36,000,000 cu. ft. of gas per day with a gas-distillate ratio of 147,500 to 1, a corrected gage from the earlier reported potential of approximately 12,000,000 cu. ft. of gas per day. Carter is now preparing to drill a west offset in a confirmation test.

Shell has two producers at Aberdeen field, a dry gas area thus far, which the company discovered at 1 Mrs. Lee Harrington, in Section 25-14s-6e, Monroe County. The discovery has an open-flow potential of 4,500,000 cu. ft. of gas per day from the Sanders sand at 3,505-32 ft. The second well was completed June 1 for a calculated open-flow potential of 15,000,000 cu. ft. of gas daily, also from the Sanders sand.

Vaughey & Vaughey discovered a small gasser on a Sinclair farmout at the 1 U.S.A., in Section 9-12s-4e, Chickasaw County, from the Evans sand at 2,402 ft. On a ⅜-in. choke this well flowed 1,060,000 cu. ft. of gas per day but does not make a great deal more on open flow.

Each of the four fields is shut in. Operators are drilling the fields, however, to establish larger reserves prior to signing gas-sale contracts. Higher reserves, naturally, will result in more favorable contracts for the producers. Though no crude has been discovered in commercial quantities, excepting distillate at Muldon and Trebloc, the subject area may develop into prominence as a natural-gas producer. It is much closer to the Atlantic Coast and New England states, with their almost insatiable demand for gas, than the major gas-producing centers of the South and Southwest.

Outlets . . . An indication of monetary returns for gas production perhaps is indicated by the fact that Texas Eastern Transmission Corp. is paying approximately 16.8 cents per thousand cubic feet of processed gas to United Gas Pipe Line Co. whose 30-in. line from South Louisiana fields ties in with Texas Eastern's new 30-in. line at Kosciusko, Miss. Texas Eastern's line extends through the central part of the basin in Monroe County northeast to near Pittsburgh. Southern Natural Gas Co. operates 22-in. parallels across mid-Mississippi through the southern portion of the basin into Alabama. In northwestern Mississippi major gas lines are operated by Tennessee Gas Transmission Co. and Texas Transmission Corp.

Seismic Surveying

All of the fields discovered to date are seismic prospects, lending much credence to the value of that form of exploration for this area. However, seismic interpretation of the complex geological features of the basin is known to be a major problem for any company shooting in the area. The story is told of one company which did detailed shooting of a prospect six times, each time discharging different size charges of explosives from different depths, and obtained six different seismic pictures.

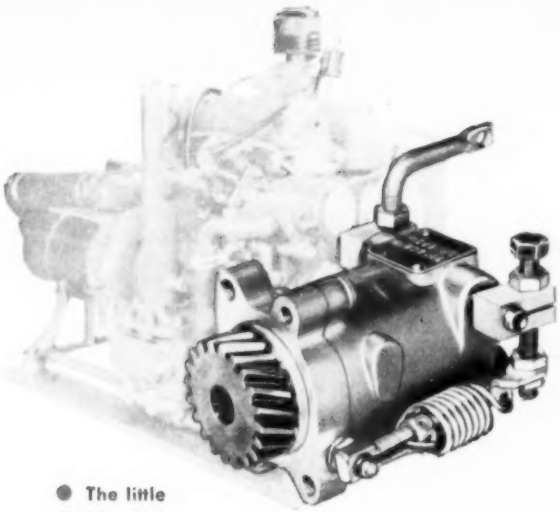
Two problems involved in seismic interpretation are the need for accurate velocity determinations and lack of assurance that the particular formation from which reflections are desired will be present throughout the area designated for shooting. The velocity-survey problem exists in most exploratory areas but especially so in the Appalachian basin where wells drilled to date indicate an erratic presence of formations, particularly in the Mississippian.

Seismic crews worked a total of 418 weeks within the basin during 1952, compared with 12 crew weeks in 1951. Through June 10, 1953, seismic crews put in a total of approximately 213 weeks, roughly the same as per the first half of 1952. Seismic activity was virtually nonexistent in the basin for the few years preceding 1952.

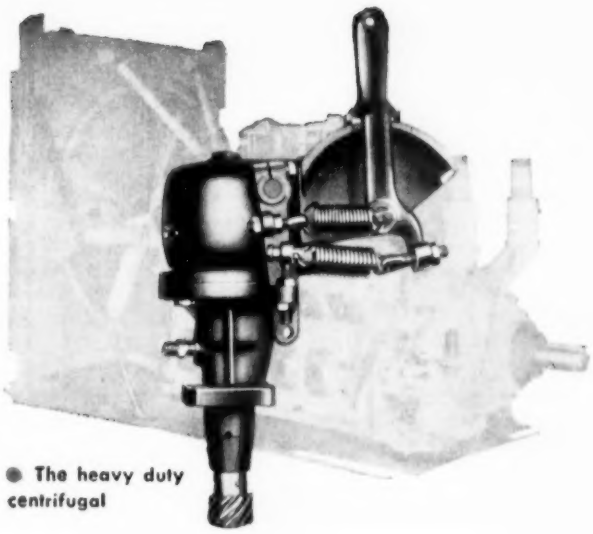
The high cost of drilling in this hard-rock country is pointed out in a survey made by Union Producing Co. of sev-

THE AUTHOR

Jim D. Harvel graduated from the University of Oklahoma in 1949 with a BA degree and a double major in government and journalism. He was managing editor of the university newspaper, "The Oklahoma Daily." Later he was employed by the Daily Oklahoman and Oklahoma City Times as an oil-news reporter and served briefly as news editor of the Clinton Daily News, Clinton, Okla. Harvel joined Pure Oil Co. as a scout at Tyler, Tex., in 1951. He has served as district scout at Shreveport for the past 17 months.



● The little 1400 series

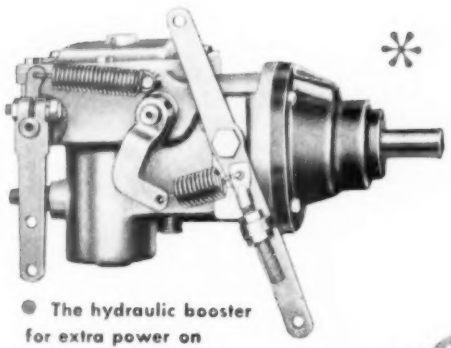


● The heavy duty centrifugal

PIERCE GOVERNORS

preferred for gas (LPG), gasoline and diesel industrial engines... big, medium and small

● The standard long range 900 series



● The hydraulic booster for extra power on racks and valves

Pierce centrifugal governors are your most economical and efficient control mechanisms for industrial engines . . . from small generator sets to monster power units . . . gas (LPG), gasoline or diesel. For engines requiring extra power to position fuel rack or valve, the Pierce centrifugal with hydraulic booster * (for original equipment only) is ideal! Service is locally available . . . your nearby Pierce Service Station is equipped for all types of Pierce Governors.

Specify PIERCE Centrifugal governor on your engines . . . for economical, thoroughly dependable control in industrial applications.

PIERCE — THE MARK OF QUALITY

THE PIERCE GOVERNOR CO., INC.

1620 OHIO AVENUE, ANDERSON, INDIANA

"World's Most Experienced Governor Manufacturer"

eral dry holes in the basin. Estimated cost of a dry hole drilled with a first-class rotary rig was reported to be approximately $1,500 per day. Cost of drilling a dry hole with a cable-tool rig operating 24 hours a day was estimated at $300 per day. It is estimated that wells drilled in the basin cost about three times as much as those in Tertiary rock areas.

A test which penetrates the entire Mississippian strata to the Tuscumbia or Iowa lime generally will average from 40 to 80 ft. per day with a rotary rig. A cable-tool rig will cut the same zone at an average of about 25 ft. per day. It is not uncommon for a rotary rig to use 60 to 70 rock bits in cutting a 3,500-ft. hole.

Obviously, high drilling costs and complexities of the geology of the area put it more in the sphere of operation by major companies. As more holes are drilled the basin may become increasingly favorable for independents. However, independents and promotors have drilled a predominance of the wells on the northern updip areas where drilling costs are reduced by shallower tests.

Formation fracturing . . . Possibly several of the new sand-oil-treatment processes will mean the difference in the basin being discarded, as it has been after lesser plays in past years, or being rejuvenated as a permanent area for exploration.

Spectacular results were obtained when Carter used a sand-oil fracture treatment in 1 Baskin, Trebloc field discovery. The well was flowing less than 500,000 cu. ft. of gas per day before treatment. After injecting diesel oil and sand into the bore opposite the Carter sand with 3,500 psi. pressure, following a formation breakdown at 4,200 psi., the well flowed a calculated 36,000,000 cu. ft. of gas per day open-flow plus approximately 7 bbl. of distillate per million cubic feet of gas. Since then Carter and Shell have had successful results in tests at other wells with the fracture method. Shell is using the method at Aberdeen field.

It appears that Carter's 1 McFadden, in Section 36-16s-5e, Clay County, will be a new gas discovery from Carter sand perforations 8,614-33 ft. after a sand-oil treatment. Still cleaning at this writing, the well was flowing through various chokes at a little less than 4,000,000 cu. ft. of wet gas per day.

Regional Setting

Although variously termed the Appalachian basin, Black Warrior basin, Coal basin, and other lesser-used terms, there is no conclusive evidence to date establishing the prospected area as a true basin. It has been referred to as a basin, for convenience, but many who apply pure geology in defining basins disagree with such references lest the term "basin" become permanent in its literature.

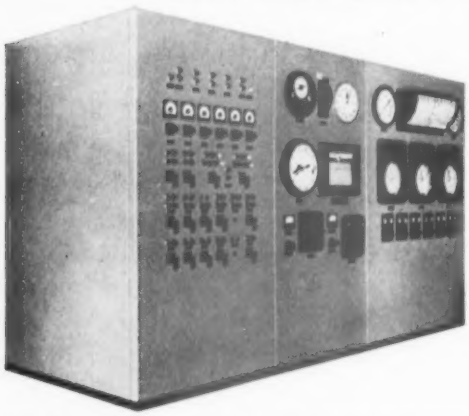
The area does have certain broad general characteristics which indicate it may be a basin. It is a triangular-shaped area compacted between the Appalachian and Ouachita mountains with a southern acute tip in the vicinity of Lauderdale County, Mississippi. On the north it is bounded by the sloping Nashville arch and Ozark uplift. It is believed to be compacted in a southwest-northeast trend by the Appalachian system of folds and faults and in a northwest-southeast trend by the Ouachita system of folds and faults. Its northeast limit is bounded roughly by Walker and Cullman counties of Alabama. The northwest limit is not defined or known, possibly being limited in northwestern Mississippi by a series of magnetic highs, and perhaps extending to the Arkansas coal basin in central Arkansas.

Steep dips . . . One of the outstanding features of the basin is a rapid deepening to the south and southwest as evi-

How to SAVE VALUABLE TIME..

ON THE PURCHASE AND INSTALLATION OF
ELECTRICAL CONTROL BOARDS

● **Write ONE purchase order for a COMPLETE control board . . . then leave everything else to us!**



"NEMCO" Double-Faced Combination Turbine and Boiler Control Board . . . piped, wired and tested at factory—then shipped AS A COMPLETE UNIT. Lighting canopy (not shown) was also shipped complete.

At the Nelson factory we will procure all necessary instruments and other components; we will do all of the fabricating, all of the wiring, all of the piping and all of the testing.

Then the control board will be shipped *as a complete unit* to your plant location. This reduces field work to an absolute minimum and speeds up completion dates. As a result, many valuable hours are saved.

We will appreciate the opportunity of quoting on your requirements for control boards, instrument panels and motor control centers.

NELSON *Electric* MANUFACTURING CO.

217 North Detroit TULSA, OKLAHOMA Telephone 2-5131

What's NEW

In Perforating, Logging, and Fishing Tool Services

McCULLOUGH
NEW SERVICES • NEW TOOLS
NEW WAYS OF DOING THINGS

Latest News About New Tools, Techniques and Services

NEW

McCULLOUGH *Radiation Well Logger with* SCINTILLOMETER (GAMMA RAY AND NEUTRON LOGS)

Accurate, Reliable, Consistent and Stable Logs on Every Run in the Well

Present day well completion programs are often based solely on logging information. Therefore, that information must be accurate and consistently reliable. The security of your entire drilling investment depends on the dependability of the information given by the log.

That's why operators everywhere are specifying the amazing new McCullough Radiation Well Logger with Scintillometer. It is the most accurate and reliable logging instrument available to the oil industry. It is a stable instrument, and because of its stability, it is consistently reliable—one or ten trips in the same well, you'll always get the same answer.

Here are some of the reasons why the McCullough Radiation Well Logger with Scintillometer gets such accurate, dependable results:

1. The Scintillometer is very short compared to the length of gaseous type counters. This enables the measurement of formations with a great deal more detail. It will measure and define very thin beds that would be averaged out with the longer counters.

2. The efficiency of the Scintillometer in measuring radiations approaches 100%. Gaseous type counters may have an efficiency in the order of 2% or less.

3. As a result of the short length and high efficiency of the Scintillometer, a much more detailed log can be produced at a faster logging speed than with other methods.

4. The Scintillometer responds only to external excitation and thus can be calibrated on an absolute scale. This scale is in International Units and assures a more accurate quantitative interpretation.

5. Because of the extreme stability of our equipment, we are able to duplicate successive runs in the same well with accuracy.

6. Characteristics such as time constant and sensitivity are controlled at the surface. Thus, these variables can be set to provide the operator with as much or as little detail in his log as he desires.

7. The Scintillometer will record the entire range of gamma radiations, or only a certain band within the range can be recorded if desired.

8. It has no instrument, temperature nor discernible cosmic drift and can be used as a valuable reference tool.

9. Simultaneous recording of a collar log simplifies "pin-point" perforating later.

10. The original record is reproduced as the final log—no retouching nor tracing is necessary.

THE McCULLOUGH RADIATION WELL LOGGER WITH SCINTILLOMETER (GAMMA RAY AND NEUTRON) IS AVAILABLE IN MOST ACTIVE OIL FIELDS—CALL YOUR McCULLOUGH SERVICE ENGINEER FOR COMPLETE INFORMATION.

PERFORATING, RADIATION LOGGING, AND FISHING TOOL SERVICE—ANYWHERE—ANYTIME.

McCULLOUGH TOOL COMPANY
5820 South Alameda Street, Los Angeles 58, California
405 McCarty Street (P. O. Box 2575) • Houston, Texas
CABLE ADDRESS: MACTOOL
EXPORT OFFICE: Los Angeles, California
CANADA: Edmonton, Calgary, Grande Prairie, Alb.; Regina, Saskatchewan
VENEZUELA: United Oilwell Service Co., S.A.; Caracas, Anaco, Maracaibo

SERVICE LOCATIONS: **TEXAS:** Houston, Snyder, Alice, Cisco, Corpus Christi, McAllen, Odessa, Tyler, San Angelo, Victoria, Wichita Falls, Luling, Beaumont, Sherman, Midkiff, El Campo. **OKLAHOMA:** Oklahoma City, Guymon, Healdton, Hominy, Wewoka. **ARKANSAS:** Magnolia. **MISSISSIPPI:** Laurel. **NEW MEXICO:** Hobbs. **KANSAS:** Great Bend. **WYOMING:** Casper. **CALIFORNIA:** Los Angeles, Avenal, Bakersfield, Ventura. **LOUISIANA:** Houma, Lake Charles, New Iberia, Shreveport. **COLORADO:** Sterling. **NORTH DAKOTA:** Williston. **UTAH:** Vernal.

denced by the difference in subsea depths of Mississippian and Devonian formations from Shell's Aberdeen field and Union Producing's field at Muldon. Dip is approximately 1,800 ft. in the 6 miles *(see Fig. 2.)* This dip is even more pronounced from the Muldon area to Carter's 1 McFadden, wildcat testing 7 miles south and west. From Muldon to the McFadden well the dip increases to approximately 490 ft. per mile, totaling a 3,400-ft. plunge. Another interesting feature of the McFadden well is the absence of much of the Tuscumbia zone or Iowa lime which has been present most universally in other wells in the heart of the basin. Only a thin section of lime and chert resembling Tuscumbia was logged. To date the McFadden well is believed to be the deepest test drilled in the basin. It is impossible to say, with present information, how far the dip continues its rate of deepening, whether it levels off, or perhaps rises again further to the south.

As a result of this regional dip of the Mississippian, the Pennsylvanian system is truncated.

On the Mississippi side of the basin and centering in Chickasaw and Monroe counties, Upper Cretaceous sediments overlay highly irregular Paleozoic strata. At no time can an operator drill a test and be sure of encountering a formation which nearby wells would indicate to be present. Structures both parallel and perpendicular to the two basin trends have been indicated by drilling and seismic work during the past year.

Sands . . . The Mississippian section has six sands and two lime sections of the Chester group which have been given names by the Mississippi Geological Society. They have been named after farms where wells have indicated a fairly well developed sand or lime. Seldom are many of the formations encountered in a single well—probably indicating lenticular-type sands. Of the Chester sands the Carter and Sanders are probably regarded as the most important, because of Sanders production at Muldon and Aberdeen and Carter production at Trebloc.

The northwest-corner counties of Alabama are of particular interest to geological surface parties because of the outcropping of Paleozoic formations in that area. One major company, which pioneered much of the work upon which the Mississippi side is being explored, has established surface-party headquarters at Jasper in Walker County, Alabama, and has been working the area for at least a year. Several anticlines are plainly visible and have been mapped along with faulted structures.

Asphaltic sands present on the surface in Alabama are believed by many geologists to represent a northward updip migration of crude. This leads to a prominent theory that such sands, with sufficient down dip to have a protective covering, may be commercially oil and gas bearing. Almost 100 wells have been drilled in this area in the past 40 years, and all had shows of oil or gas or both. Generally they were nonproductive because of poor porosity and permeability. Several small gas fields have been found in the area, however, with few wells capable of making much more than 500,000 cu. ft. of gas per day. They include the Nauvoo field on the county line of Walker and Winston counties, Hamilton field in Marion County, Belgreen field in Franklin County, and Jasper field in Walker County. They were found in Pennsylvanian and Mississippian sands and limes of depths less than 2,000 ft. Some have furnished gas locally.

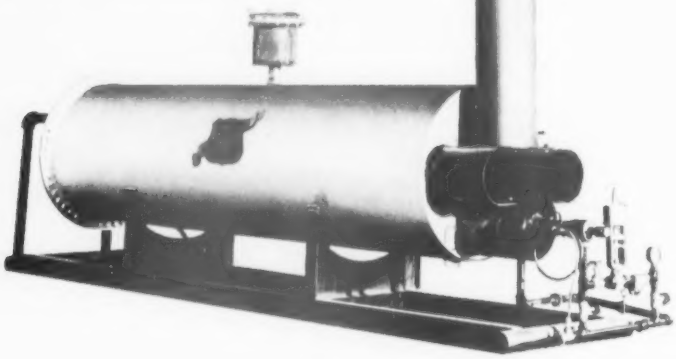
To the south of the above area, primarily in Lamar and Pickens counties, Upper Cretaceous beds cover the Paleozoic strata. Several wells have been drilled in this area in recent years, all with shows.

(Continued on page 137)

SAFE
EFFICIENT
ECONOMICAL
AND
Carefree...
FOR HEATING CORROSIVE OIL OR HIGH PRESSURE GAS

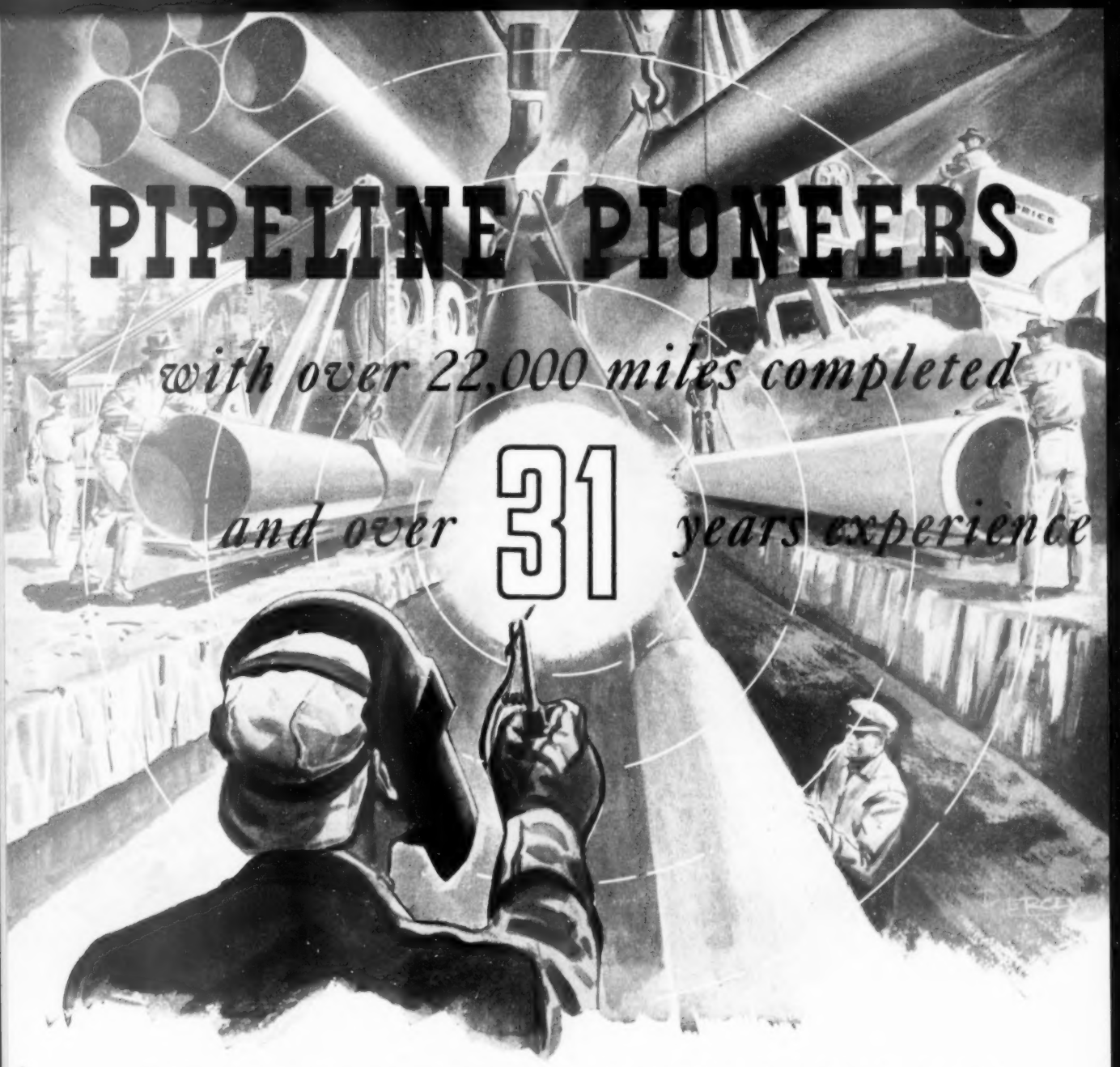
The Sivalls indirect heater is compact, reducing heat loss by radiation to a minimum. Temperature is automatically controlled. A condenser compensates for water loss. Firebox design and construction permit low first cost and maintenance. Flow tube bundle is removable. Multi-pass construction is available with either cast iron or seamless steel pipe.

The Sivalls standard heater is skid mounted. Special units can be furnished trailer mounted.



WRITE FOR DESCRIPTIVE LITERATURE

SIVALLS TANKS, INC.
P.O. BOX 1152 ODESSA, TEXAS



The many oil and natural gas companies who have relied on H. C. Price Co. for their pipeline construction know the value of the years and miles of experience behind "America's Foremost Pipeline Constructors" . . . They also know HCPCO's integrity and punctuality are backed by an established organization noted for its dependability. . . . While this record of past achievement is a source of considerable pride, H. C. Price Co. views the years ahead as an opportunity of even greater service to the oil and gas industry.

H. C. **PRICE** CO.

PIPELINE **PRICE** CONSTRUCTORS

PHILADELPHIA • BARTLESVILLE • NEW ORLEANS

America's Foremost Pipeline Constructors

Cut costs 40% with

ALCOA UTILITUBE

36,000 feet of ALCOA Aluminum Coiled Tube serves air, dried by Alcoa *Activated*® Alumina, to catalytic cracking unit at the Anderson-Prichard Oil Corporation, Arkansas City, Kansas. Partially exposed to hydrogen sulfide, tubing shows no corrosion, has required no maintenance since installation in September, 1952.

ALCOA UTILITUBE® is the lowest cost corrosion-resistant tube you can buy—up to 40 per cent less than other corrosion-resistant metals. It gives you 3 times more feet per pound. It is easier to form, flare and bend than annealed copper. It will not gum, sludge or discolor the fluids it carries.

ALCOA UTILITUBE comes in standard 50 and 100 foot lengths and in economical, long lengths up to 1,000 feet in some sizes.

ALCOA UTILITUBE is designed to handle fuel and lubricants in engines, air in instrument systems, fluids in hydraulic systems, cutting compounds in machine tools, etc. For complete information, write for the new booklet: "Alcoa Utilitube."

ALUMINUM COMPANY OF AMERICA
1003-G Alcoa Building, Pittsburgh 19, Pa.

®Registered Trademark, Aluminum Co. of America

Alcoa Aluminum

ALUMINUM COMPANY OF AMERICA

SHIPPING PROBLEMS
SLOWING YOU DOWN?
WE'LL SPEED IT UP FOR YOU!

Got a rush order to be shipped? We'll do it on the double! Call The Tulsa Crating Company for any or all of these services:

PACKAGING for export or domestic shipment.
SCIENTIFIC PROCESSING against corrosion, moisture, air dust, all climatic conditions.
DOCUMENTATION: Preparing and forwarding documents needed for export shipping.
AIR SHIPPING: As agent for International Air Transport Association we arrange all details of shipment by air.
COUNSELING on details of export shipping.

TULSA CRATING CO.
519 SO. ROCKFORD • TULSA 10, U.S.A.
PHONES 3-6482, 3-3492

KINZBACH POLISHED ROD STUFFING BOX

POSITIVE SEAL OFF
SELF ALIGNING
SAFE
ECONOMICAL

Kinzbach Polished Rod Stuffing Boxes are plastic packed, have a floating, self-aligning gland and hold positive seals under the toughest conditions. Packing may be added and seal tightened easily without shutting in the well. Available in all popular sizes of polished rods.

KINZBACH TOOL CO INC

KINZBACH TOOL CO., INC.
P. O. BOX 277 HOUSTON, TEXAS
Export Office: 74 Trinity Place, New York, N. Y.

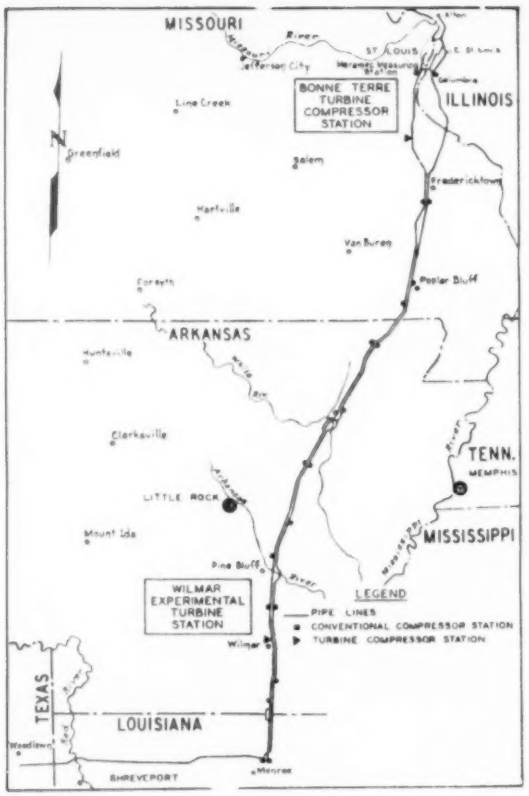


Fig. 1—(Left) Location of first gas turbine-centrifugal compressor unit on Mississippi River Fuel Corp. system. Unit was moved in 1950 to Bonne Terre station. At this market end of the No. 1 main line discharge pressure is 425 psi.

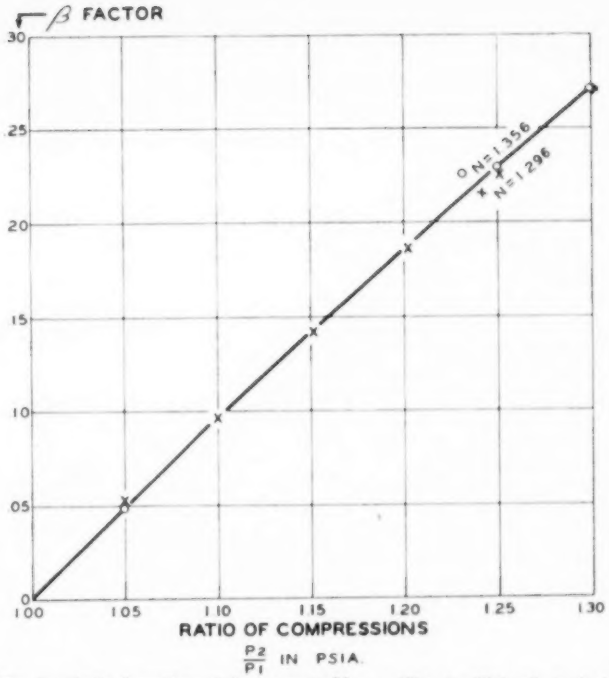


Fig. 2—Plot of β factor versus ratio of compressions (see Table 2). Note points plotted for N values of 1.296 and 1.356 ($N = C_p/C_v$).

Report on operating experience with

First Pipe-Line Centrifugal Compressor

Here's what has been learned in using turbine as an operational unit during the past two years

by G. Carl Cooper, Jr.*

A 1,850-HP., simple-cycle, gas-turbine centrifugal compressor unit in booster service has been tested for several years by Mississippi River Fuel Corp. and United Gas Corp.

The installation employs a Westinghouse turbine and Ingersoll-Rand centrifugal compressor.

This was the pioneer centrifugal compressor installation on a pipe line, employing a single-shaft, simple-cycle system. Since then a number of more-modern units involving large turbines with regenerative cycles of two-shaft design have gone into operation. However, this report is of prime interest in that it shares with the industry what Mississippi River Fuel Corp. has learned in using the gas turbine as an operational unit during the past 2 years.

Station location . . . Fig. 1 shows location of the turbine-compressor unit, first at Wilmar, Ark., and later at Bonne Terre, Mo. It was installed at Wilmar station as an experiment in 1949, then moved to Bonne Terre station. The latter facilities were completed in January 1951. It is employed at Bonne Terre to increase peak hourly flows and delivery pressures into Meramec measuring station adjacent to St. Louis for assistance in handling winter peaks caused by heating requirements and to divert gas in the summer from the No. 2 main line.

1. Experience Summary

This summary represents the considered opinions reached through operating and studying the simple-cycle unit which is a part of Mississippi's pipeline system.

● **Practical unit.** The 1,850-hp. internal-combustion gas turbine coupled to a centrifugal compressor is a practical unit for compression of gas on pipe lines. It is capable of sustained operation and has developed 2,000 b.hp. under test loading. Certain features of the gas-turbine unit make it attractive for the solution of specific problems encountered in gas transmission. A station using turbines has a low installation cost per horsepower, necessitates a small physical area per unit, minimiz-

*Assistant general superintendent of Mississippi River Fuel Corp., St. Louis, Mo. Paper presented at Southern Gas Association meeting, New Orleans, May 1953.

denced by the difference in subsea depths of Mississippian and Devonian formations from Shell's Aberdeen field and Union Producing's field at Muldon. Dip is approximately 1,800 ft. in the 6 miles *(see Fig. 2.)* This dip is even more pronounced from the Muldon area to Carter's 1 McFadden, wildcat testing 7 miles south and west. From Muldon to the McFadden well the dip increases to approximately 490 ft. per mile, totaling a 3,400-ft. plunge. Another interesting feature of the McFadden well is the absence of much of the Tuscumbia zone or Iowa lime which has been present most universally in other wells in the heart of the basin. Only a thin section of lime and chert resembling Tuscumbia was logged. To date the McFadden well is believed to be the deepest test drilled in the basin. It is impossible to say, with present information, how far the dip continues its rate of deepening, whether it levels off, or perhaps rises again further to the south.

As a result of this regional dip of the Mississippian, the Pennsylvanian system is truncated.

On the Mississippi side of the basin and centering in Chickasaw and Monroe counties, Upper Cretaceous sediments overlay highly irregular Paleozoic strata. At no time can an operator drill a test and be sure of encountering a formation which nearby wells would indicate to be present. Structures both parallel and perpendicular to the two basin trends have been indicated by drilling and seismic work during the past year.

Sands . . . The Mississippian section has six sands and two lime sections of the Chester group which have been given names by the Mississippi Geological Society. They have been named after farms where wells have indicated a fairly well developed sand or lime. Seldom are many of the formations encountered in a single well—probably indicating lenticular-type sands. Of the Chester sands the Carter and Sanders are probably regarded as the most important, because of Sanders production at Muldon and Aberdeen and Carter production at Trebloc.

The northwest-corner counties of Alabama are of particular interest to geological surface parties because of the outcropping of Paleozoic formations in that area. One major company, which pioneered much of the work upon which the Mississippi side is being explored, has established surface-party headquarters at Jasper in Walker County, Alabama, and has been working the area for at least a year. Several anticlines are plainly visible and have been mapped along with faulted structures.

Asphaltic sands present on the surface in Alabama are believed by many geologists to represent a northward updip migration of crude. This leads to a prominent theory that such sands, with sufficient down dip to have a protective covering, may be commercially oil and gas bearing. Almost 100 wells have been drilled in this area in the past 40 years, and all had shows of oil or gas or both. Generally they were nonproductive because of poor porosity and permeability. Several small gas fields have been found in the area, however, with few wells capable of making much more than 500,000 cu. ft. of gas per day. They include the Nauvoo field on the county line of Walker and Winston counties, Hamilton field in Marion County, Belgreen field in Franklin County, and Jasper field in Walker County. They were found in Pennsylvanian and Mississippian sands and limes of depths less than 2,000 ft. Some have furnished gas locally.

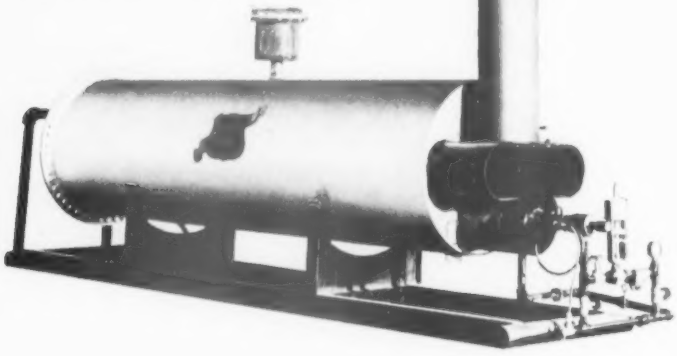
To the south of the above area, primarily in Lamar and Pickens counties, Upper Cretaceous beds cover the Paleozoic strata. Several wells have been drilled in this area in recent years, all with shows.

(Continued on page 137)

SAFE
EFFICIENT
ECONOMICAL
AND
Carefree...
FOR HEATING CORROSIVE OIL OR HIGH PRESSURE GAS

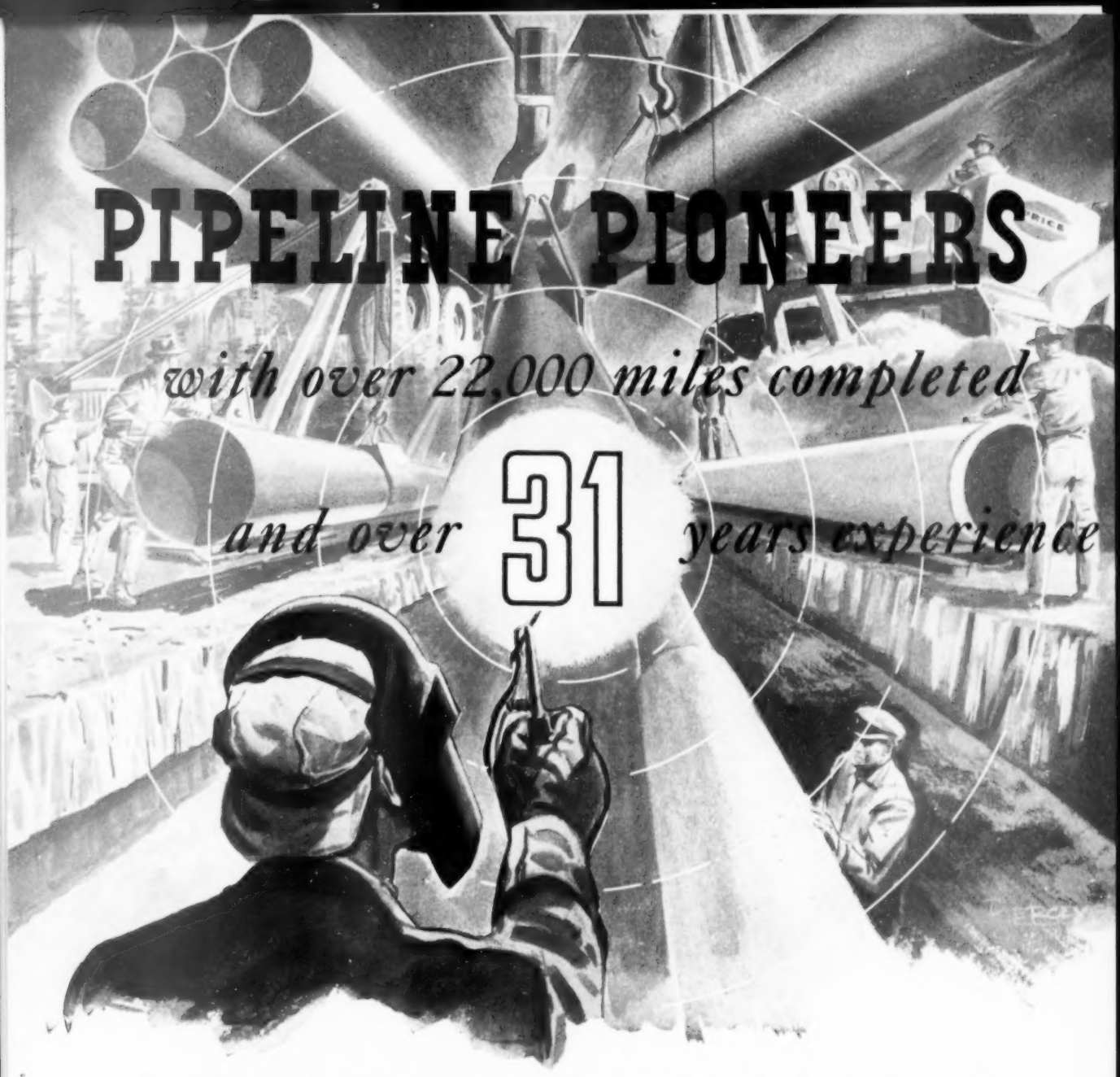
The Sivalls indirect heater is compact, reducing heat loss by radiation to a minimum. Temperature is automatically controlled. A condenser compensates for water loss. Firebox design and construction permit low first cost and maintenance. Flow tube bundle is removable. Multi-pass construction is available with either cast iron or seamless steel pipe.

The Sivalls standard heater is skid mounted. Special units can be furnished trailer mounted.



WRITE FOR DESCRIPTIVE LITERATURE

SIVALLS TANKS, INC.
P.O. BOX 1152 ODESSA, TEXAS



The many oil and natural gas companies who have relied on H. C. Price Co. for their pipeline construction know the value of the years and miles of experience behind "America's Foremost Pipeline Constructors" . . . They also know HCPCO's integrity and punctuality are backed by an established organization noted for its dependability. . . . While this record of past achievement is a source of considerable pride, H. C. Price Co. views the years ahead as an opportunity of even greater service to the oil and gas industry.

H. C. **PRICE** CO.

PIPELINE
PRICE
CONSTRUCTORS

PHILADELPHIA • BARTLESVILLE • NEW ORLEANS

America's Foremost Pipeline Constructors

Cut costs 40% with

ALCOA UTILITUBE

36,000 feet of ALCOA Aluminum Coiled Tube serves air, dried by Alcoa *Activated*® Alumina, to catalytic cracking unit at the Anderson-Prichard Oil Corporation, Arkansas City, Kansas. Partially exposed to hydrogen sulfide, tubing shows no corrosion, has required no maintenance since installation in September, 1952.

ALCOA UTILITUBE* is the lowest cost corrosion-resistant tube you can buy—up to 40 per cent less than other corrosion-resistant metals. It gives you 3 times more feet per pound. It is easier to form, flare and bend than annealed copper. It will not gum, sludge or discolor the fluids it carries.

ALCOA UTILITUBE comes in standard 50 and 100 foot lengths and in economical, long lengths up to 1,000 feet in some sizes.

ALCOA UTILITUBE is designed to handle fuel and lubricants in engines, air in instrument systems, fluids in hydraulic systems, cutting compounds in machine tools, etc. For complete information, write for the new booklet: "Alcoa Utilitube."

ALUMINUM COMPANY OF AMERICA
1003-G Alcoa Building, Pittsburgh 19, Pa.

*Registered Trademark, Aluminum Co. of America

Alcoa Aluminum

ALUMINUM COMPANY OF AMERICA

SHIPPING PROBLEMS
SLOWING YOU DOWN?
WE'LL SPEED IT UP FOR YOU!

Got a rush order to be shipped? We'll do it on the double! Call The Tulsa Crating Company for any or all of these services:

PACKAGING for export or domestic shipment.
SCIENTIFIC PROCESSING against corrosion, moisture, air dust, all climatic conditions.
DOCUMENTATION: Preparing and forwarding documents needed for export shipping.
AIR SHIPPING: As agent for International Air Transport Association we arrange all details of shipment by air.
COUNSELING on details of export shipping.

TULSA CRATING CO.
519 SO. ROCKFORD • TULSA 10, U.S.A.
PHONES 3-6482, 3-3492

KINZBACH POLISHED ROD STUFFING BOX

POSITIVE SEAL OFF
SELF ALIGNING
SAFE
ECONOMICAL

Kinzbach Polished Rod Stuffing Boxes are plastic packed, have a floating, self-aligning gland and hold positive seals under the toughest conditions. Packing may be added and seal tightened easily without shutting in the well. Available in all popular sizes of polished rods.

KINZBACH TOOL CO INC

KINZBACH TOOL CO., INC.
P. O. BOX 277 HOUSTON, TEXAS
Export Office: 74 Trinity Place, New York, N. Y.

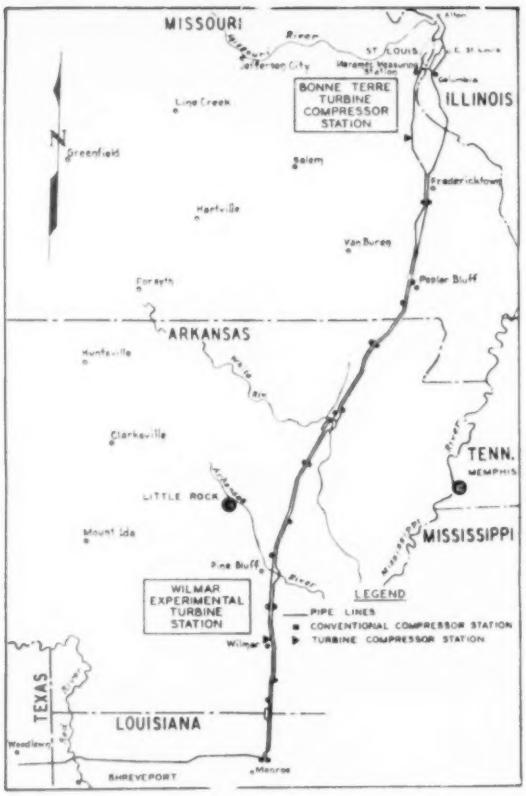


Fig. 1—(Left) Location of first gas turbine-centrifugal compressor unit on Mississippi River Fuel Corp. system. Unit was moved in 1950 to Bonne Terre station. At this market end of the No. 1 main line discharge pressure is 425 psi.

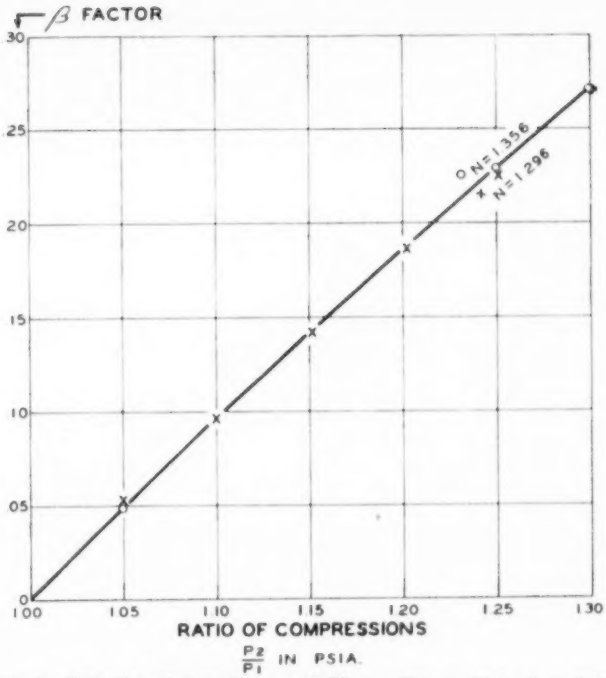


Fig. 2—Plot of β factor versus ratio of compressions (see Table 2). Note points plotted for N values of 1.296 and 1.356 ($N = C_p/C_v$).

Report on operating experience with

First Pipe-Line Centrifugal Compressor

Here's what has been learned in using turbine as an operational unit during the past two years

by G. Carl Cooper, Jr.*

A 1,850-HP., simple-cycle, gas-turbine centrifugal compressor unit in booster service has been tested for several years by Mississippi River Fuel Corp. and United Gas Corp.

The installation employs a Westinghouse turbine and Ingersoll-Rand centrifugal compressor.

This was the pioneer centrifugal compressor installation on a pipe line, employing a single-shaft, simple-cycle system. Since then a number of more-modern units involving large turbines with regenerative cycles of two-shaft design have gone into operation. However, this report is of prime interest in that it shares with the industry what Mississippi River Fuel Corp. has learned in using the gas turbine as an operational unit during the past 2 years.

*Assistant general superintendent of Mississippi River Fuel Corp., St. Louis, Mo. Paper presented at Southern Gas Association meeting, New Orleans, May 1953.

Station location . . . Fig. 1 shows location of the turbine-compressor unit, first at Wilmar, Ark., and later at Bonne Terre, Mo. It was installed at Wilmar station as an experiment in 1949, then moved to Bonne Terre station. The latter facilities were completed in January 1951. It is employed at Bonne Terre to increase peak hourly flows and delivery pressures into Meramec measuring station adjacent to St. Louis for assistance in handling winter peaks caused by heating requirements and to divert gas in the summer from the No. 2 main line.

1. Experience Summary

This summary represents the considered opinions reached through operating and studying the simple-cycle unit which is a part of Mississippi's pipeline system.

● **Practical unit.** The 1,850-hp. internal-combustion gas turbine coupled to a centrifugal compressor is a practical unit for compression of gas on pipe lines. It is capable of sustained operation and has developed 2,000 b.hp. under test loading. Certain features of the gas-turbine unit make it attractive for the solution of specific problems encountered in gas transmission. A station using turbines has a low installation cost per horsepower, necessitates a small physical area per unit, minimiz-

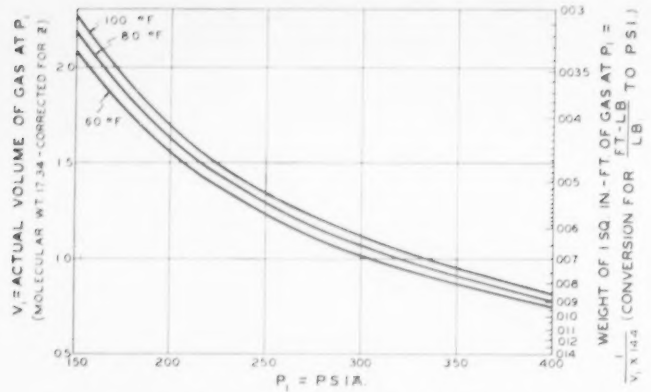

V = ACTUAL VOLUME OF GAS AT P
(MOLECULAR WT 17.34 - CORRECTED FOR Z)
100 °F
80 °F
60 °F
P1 = PSIA
WEIGHT OF 1 SQ IN - FT OF GAS AT P1 = 1/V1 X 144 (CONVERSION FOR FT-LB/LB TO PSI)

Fig. 3—Centrifugal compressor volume for adiabatic head equation.

ing the expense of buildings, and requires very little concrete in foundations. No station auxiliaries need be provided except for an office, sanitary and drinking water, a minimum of electrical power, fuel-oil-storage facilities if required, and a small store room for extra stores and supplies.

● **Operating personnel.** Regular station personnel can learn quickly to operate and maintain a turbine compressor unit. Our experience indicates that, if only a few changes were made in auxiliary equipment, the station could be operated with only one person per tour. The turbine is well suited to application of automatic protective and operating devices which may make future designs of such a unit able to function unattended.

● **Flexible performance.** No instability or flutter in gas-compressor operation was found from 110 M.M.c.f. per day rate of flow to 233 M.M.c.f. per day (corrected to 8,750 r.p.m. and 400 psia. discharge pressure). The compressor design point was 190 M.M.c.f. per day under these conditions. Stable flow rates of from 77 to 191 M.M.c.f. daily (actual measured — uncorrected for speed or discharge pressure) were handled by the compressor at pressure ratios of from 1.225 at 179 M.M.c.f. daily (corrected) and 8,750 r.p.m. to 1.164 at 216 M.M.c.f. daily (corrected) and 8,750 r.p.m.

At low speed and high load the compressor developed a pressure ratio as low as 1.139 and at high speed and low load a ratio as high as 1.241. Suction pressures of from 228 to 347 psia., which were established during the operating test, made only a slight change in the ratio of pressures developed for an equal flow rate. The unit was very flexible for handling changing loads at low ratios of pressures.

● **Two-shaft unit better.** The direct connection between the turbine and compressor did not permit independent variation of the compressor speed to use the full horsepower output of the turbine at capacities less than the design flow rates. The data show that the unit operated a considerable portion of the time at less than the 1,850 rated horsepower even though it is capable of producing 2,000 hp. when proper loading conditions occur in the course of pipe-line operation.

Another result of this direct connection, and the resulting operation at lower-than-optimum design rating, is a lower-than-design thermal efficiency. At these lower flow rates usually experienced in regular operation the thermal efficiency of the turbine varied between 13.5 and 15.5 per cent. At a 2,000-hp. loading the thermal efficiency of the turbine was 16.5 per cent. It is concluded that separation of the turbine into a turbine to power the air compressor on one shaft with the axial-flow air compressor, and a turbine on the other shaft with the gas compressor would permit operation at higher thermal efficiencies and greater range of gas-compressor loadings than the simple-cycle, single-shaft unit.

● **Advantages with regenerator.** Utilization of the exhaust heat of 750° F. to preheat the combustion air at 60 psig. by heat exchange should improve the thermal efficiency of a simple-cycle unit as used in the test. A regenerator was not used in this series of tests because it was not deemed economical for this size unit.

● **Converted railway unit.** The turbine, a converted railway unit, was equipped with too many devices, controls, and supervisory meters, for a unit used strictly for pipe-line service.

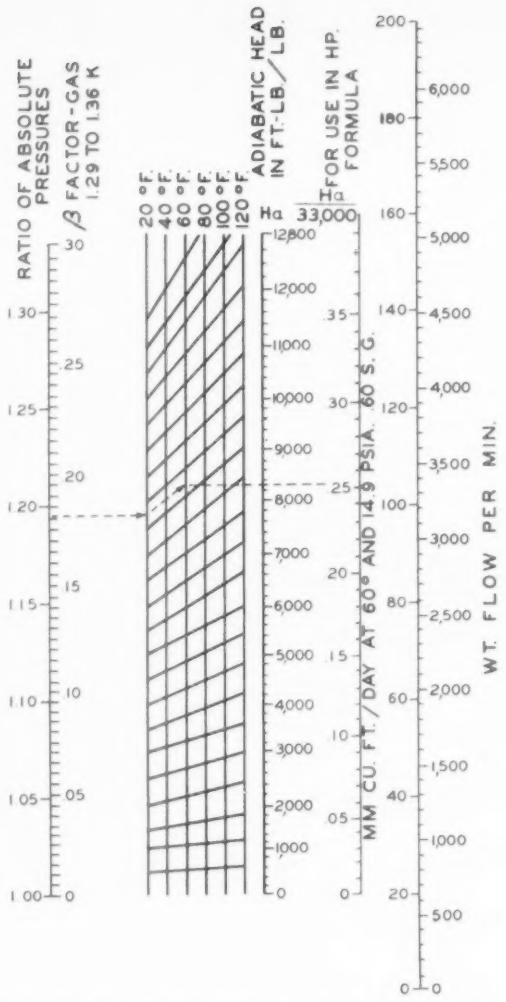


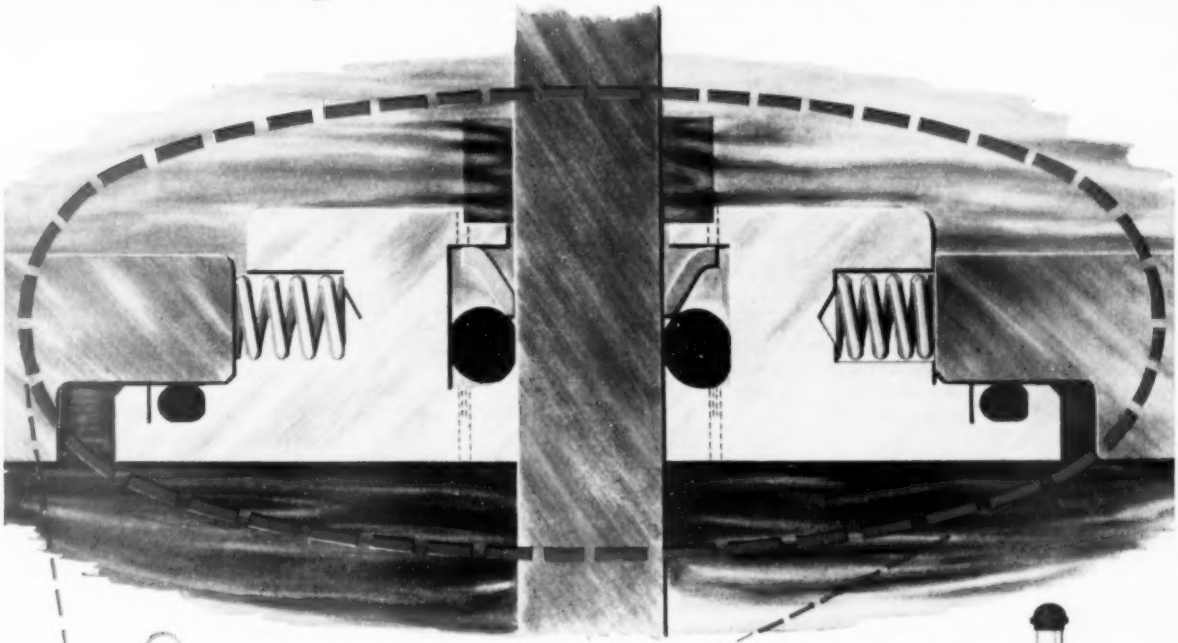
Fig. 4—Centrifugal-compressor head and horsepower-calculation graph.

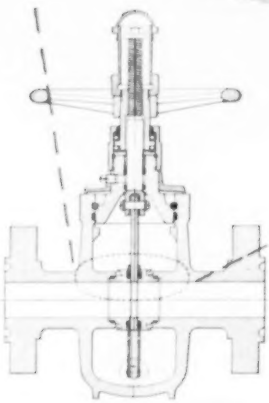
● **Starting.** Electrical starting facilities should be replaced by some type of gas-operated equipment to make the turbine dependent only on the pipe-line gas for starting.

● **Oil consumption.** Use of lubrication and seal oil has steadied down to about 1 gal. per 24 hours for both the turbine and compressor combined. This represents a tremendous saving in oil consumption when compared to conventional engine and reciprocating-compressor units.

● **Fuel consumption.** The unit used about 238 gal. per hour of fuel oil or 28 M.c.f. per hour of 1,045-B.t.u. natural gas at full horsepower output. The turbine thus uses about 16,000 B.t.u. per hour per brake horsepower. The type of oil that was used was many times more expensive than gas for fuel. Use of Bunker "C," for which the turbine combustors originally were designed, would have been more economical than operating with fuel oil.

Multiple SEALING Action!

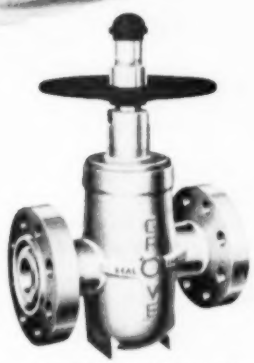




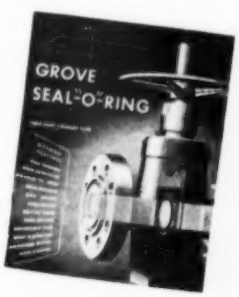
Simplest of all High-Pressure Gate Valve Designs. Opens easily—closes dead-tight with far less torque on hand wheel.

multiplied by Line Pressure

As a full opening conduit type valve, Grove SEAL "O" RING Gate Valve provides an impassable seal that shuts off bubble-tight without resorting to wedges, plugs, lubricants or other packing devices. Positive dead-tight sealing action of polished port-plate and seats is augmented by flexibly resilient "O" ring seals, retained within seat ring assemblies. Pressure in either direction of flow multiplies sealing action. The more pressure the greater the seal. Get full details, today.



Streamlined inside and out in a broad range of sizes for pressures up to 10,000 lbs.



Write for new SEAL-"O"-RING engineering bulletin No. G 53.

Available through leading Oil Field Supply Stores

GROVE SEAL-"O"-RING GATE VALVE

GROVE SEAL-"O"-RING Gate Valves

GROVE REGULATOR COMPANY • 65th & Hollis Sts., Oakland 8, Calif.

HOUSTON • LOS ANGELES • NEW YORK

Southwest Division Offices

CORPUS CHRISTI, TEXAS, 1522 South Staples St. • ODESSA, TEXAS, 2604 Kermit Highway • DALLAS, TEXAS, 1334 Fidelity Union Life Bldg.
TULSA, OKLAHOMA, 318 Thompson Bldg. • LAFAYETTE, LOUISIANA, 101 Berkeley Street

● **No water.** Water is not required for operation of either the turbine or compressor, which makes the unit very adaptable for intermittent service in cold climates or for use in locations where water supply is extremely limited.

● **Low pressure ratio.** The relatively low ratio of pressures developed by the gas compressor makes it imperative to good over-all station efficiency to design the main gas piping for very low pressure drop.

● **Hp. determination.** For field determination of the horsepower developed, the flow rate through the gas compressor is required. At Bonne Terre the station is close to Meramec measuring station, and the pressure drop occasioned by metering at the compressor station is avoided.

● **Higher efficiency possible.** Improvement in thermal efficiency by the utilization of higher temperatures on future, more-advanced blading materials combined with the addition of heat-recovery equipment should make this type of unit more desirable to the gas-transmission industry.

2. Suggested Changes

The tests have indicated that this converted locomotive turbine could be improved in stationary service by the following changes, many of which have been incorporated in later Westinghouse designs:

● Placing the turbine end bearing outside the hot-gas exhaust stack to reduce heat transfer to the bearing and lubricating oil.

● Supports for the turbine should be so designed that combustor heat will not cause distortion and affect the alignment of the turbine.

● Research should be continued to further the design of the rotor.

● The outlet stack for spent gases should be far enough from the air intake to prevent dirt and products of combustion vapors from entering the intake air stream to the air compressor.

● During operation the turbine should furnish its own auxiliary power to prevent shutdowns from power failures. A small gas-engine generator or purchased power would be required for operation of emergency lighting and operation of the cooling-down rotating motor.

● Combination oil and gas combustors should be provided for operation in peak-hour and peak-day line-packing service on the market end of the transmission line to save gas when it is vitally needed for customer service.

TABLE 1
Station Department Summary of Average Operating Conditions, Bonne Terre Station for Year 1951

FUEL OIL OPERATION:
- Hours operated on fuel oil—118.
- Oil average heating value—140,000 B.t.u. per gal., 0.857 specific gravity.
- Unit consumed approximately 200 gal. per hour when delivering 1,470 b.hp.
- Calculated thermal efficiency—13.3 per cent, 0.136 gal. oil/b.hp. hour.
- Lube oil consumption approximately 1 gal./24 hours.
- R.p.m. varied between 8,000 and 8,450.
- Average combustor temperature—1,225° F. (winter).

NATURAL GAS OPERATION:
- Hours operated on gas—2,581.
- Gas average heating value—1,045 B.t.u./cu. ft., 0.60 specific gravity.
- Unit consumed 23.4 M.c.f./hour when delivering 1,540 b.hp.
- Calculated thermal efficiency—16.0 per cent, 15.19 cu. ft. gas/b.hp. hour.
- Lube oil consumption approximately 1 gal./24 hours.
- R.p.m. relatively constant at 8,000.
- Average combustor temperature—1,080°-1,100° F. (winter).
- Average combustor temperature—1,150°-1,200° F. (summer).

3. Operating Experience

During 1951 operation was with oil fuel in January, February, and March to serve the load on peak days and during peak hours to move the line pack. Operation with gas fuel in 1951 was in the summer months to divert gas to Line No. 1 from Line No. 2 (which operates at a discharge pressure of 700 psi.) for the benefit of experimental storage project. Further operation with gas fuel continued into the fall and winter of 1951.

Table 1 summarizes the 1951 operating experience.

In general, the only operating difficulty of any consequence in 1951 was a shutdown from June 26 to July 10 to tighten the rotor blading in the slots of the solid-type rotor then in use. It was determined to install a disk-type rotor as soon as the design and testing by Westinghouse Electric Corp. should have been completed. The summer operation proved that added turbine-lube-oil cooling would be required. Additional insulation was provided on the Ingersoll-Rand compressor to eliminate icing trouble with the pressure-reduction valve seal on the oil return. No discontinuity of service was occasioned by the cooling or icing problems.

Operation in 1952 . . . Installation of a field compressor station in the experimental storage field to test deeper formations eliminated the requirement that the turbine station be operated during the summer. It was still required in the fall and winter.

On January 27 a new fuel manifold

TABLE 2—DERIVATION OF VALUES FOR ADIABATIC FORMULAS*

1. $K = \frac{C_p}{C_v} = 1.296$

then

2. $\frac{K-1}{K} = \frac{1.296-1}{1.296} = 0.2285$

3. From $T_2 = T_1 \left(\frac{P_2}{P_1}\right)^{(K-1)/KE}$

Where T_1, T_2, P_1 and P_2 are absolute values

E = adiabatic efficiency

4. $T_2 = T_1 \left(\frac{P_2}{P_1}\right)^{0.2285/E}$

5. And $H_a = 144\ P_1V_1 \frac{K}{K-1} \times \left[\left(\frac{P_2}{P_1}\right)^{(K-1)/K} - 1\right]$

Where H_a is the hydraulic head in ft.-lb./lb.

6. $H_a = 144\ P_1V_1\beta$

Where β is the mean effective pressure ratio

7. $H_a = RT_1\beta$

Where R is the gas constant divided by mol wt. = 1,545/17.34 = 89.0

Mol wt. is 0.6 × 28.9 = 17.34

8. $H_a = 89.0\beta T_1$

9. $H_a = \frac{\text{Head in lb./sq. in.}}{\text{Conversion factor}}$ (Fig. 3)

10. $144\ P_1V_1 = 1{,}545\ ZNT_1$

Where $N = \frac{1}{17.34} = \frac{1}{\text{Mol wt.}}$

11. $V_1 = \frac{89.0\ ZT_1}{144\ P_1}$

Where V_1 = vol. of 1 lb. of gas in cubic feet at P_1 and T_1

12. Head, lb./sq. in., $= \frac{H_a}{144\ V_1}$

13. Head = H_a × conversion factor (Fig. 3)

14. B.HP. $= \frac{\text{Wt. flow lb./min.} \times H_a}{33{,}000 \times E}$

15. B.HP. = (Lb./min. × V_1) × 144/33,000 × P_1/β E

*Basic formulas from paper presented before the December 1946 meeting of the California Natural Gas Association revised and presented before the October 11, 1947, meeting of the Oklahoma Section, American Society of Chemical Engineers, by T. R. Foster, manager, Turbine Machinery Sales, Clark Bros. Co., Inc., Olean, N. Y.

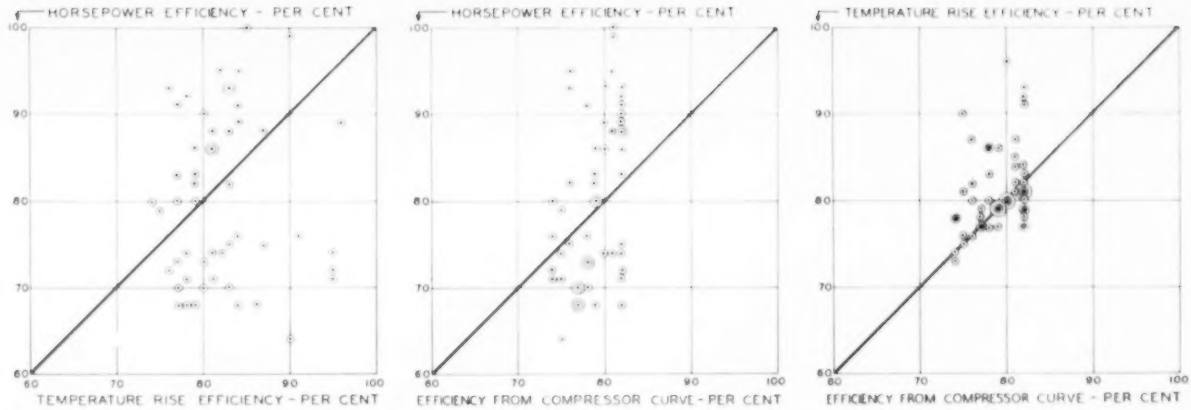

HORSEPOWER EFFICIENCY - PER CENT
TEMPERATURE RISE EFFICIENCY - PER CENT
HORSEPOWER EFFICIENCY - PER CENT
EFFICIENCY FROM COMPRESSOR CURVE - PER CENT
TEMPERATURE RISE EFFICIENCY - PER CENT
EFFICIENCY FROM COMPRESSOR CURVE - PER CENT

Fig. 5—(a) Correlation of efficiency calculated from Wilmar station data. Horsepower efficiency is equal to adiabatic compressor horsepower divided by shaft horsepower. (b) and (c) Correlation of efficiency calculated from Wilmar station data with factory compressor curve.

and dual-fuel (oil or gas) nozzles were installed in the combustors. Change in fuel while operating from gas to oil and the return to gas was successful.

On February 22 blade failure occurred and the rotor and stator blading was destroyed. This rotor had been in service for 3,228 hours. For the first time in Westinghouse history, we are told, a reblading job on this type of unit was done in the field. One month later, by March 23, repairs were completed. The repaired rotor was used until November 14 and 15 when a shutdown was made to install the new disk-type rotor which had been received from the factory. By the end of 1952 the new rotor had been in service 1,071 hours. It is still in service.

4. Calculating Performance

Reasonably accurate performance calculations result from considering polytropic, hydraulic, and temperature-rise efficiencies identical in the low-compression-ratio, single-stage uncooled compressors in which internally confined radiation renders heat losses negligible. Table 2 gives the "Derivation of Values for Adiabatic Formulas" which lists the formulas required for solution of hydraulic head developed, efficiency, brake-horsepower input, and adiabatic-horsepower output.

The gas on which this turbine compressor unit was tested has the following physical characteristics:

Ratio of specific heats $\frac{C_p}{C_v} = 1.296$.

Specific gravity = 0.60.

Molecular weight = 17.34.

Pressure base of flow data = 14.9 psia.

For your convenience an actual set of data has been computed as an example and the procedure shown on Table 3.

From this typical calculation, it is evident that reasonably accurate results can be obtained from rather simple field data concerning the performance of a gas turbine and compressor unit. Considerable care must be exercised to locate properly and to use accurate thermometers since the temperature difference is small. Pressures should be taken at proper locations and very accurately, preferably with deadweight gages. The flow through the unit and the fuel consumption should be carefully measured.

A mass of data was submitted to the

Table 3—Example of Calculation

Data

Date 9-8-49, time 6:00 p.m., 1,000 B.t.u. at 60° F., 14.9 psia.

Fuel 740 M.c.f./day, turbine speed 8,750 r.p.m.

Turbine air inlet 83° F., combustor temperature 1,266° F.

Gas volume 183.2 MM.c.f. D at 14.9 psia.

Gas inlet temperature 76° F. = 536° K. Outlet 100° F. = 560° K.

Gas inlet pressure 293.0 psia. Outlet 340.4 psia.

I.R. Co. Research Department Calculated E = 0.77).

Computation: Equations From Table 2

(1) From Equation 4

$$T_2 = T_1 \left(\frac{P_2}{P_1}\right)^{\frac{k-1}{k}}$$

$$560 = 536 \left(\frac{340.4}{293.0}\right)^{\frac{k-1}{k}}$$

(2) $T_2 - T_1 = 560 - 536 = 1.046$

$= (1.161)^{\frac{k-1}{k}}$

(3) $E = 0.2285 \times 0.3015 = 0.76$

(4) From Equation 8:

$$H_a = 89.03T = 89.0\beta(560)$$

(5) From Fig. 1,

$\beta = 0.151$ $H_a = 89.0 (0.151)(560)$

(6) $= 7,526$ (calculated)

(7) From Equation 13,

$$H_a = \frac{P_2 - P_1}{\text{Conversion factor}}$$

$$= \frac{340.4 - 293.0}{0.0063} = 7,510 \text{ (actual)}$$

(8) From Fig. 3, Conversion factor = 0.0063

(9) From Fig. 4, 183.2 MM.c.f. D = 5,900 lb./min. of gas

From Equation 14 and (3), (6), and (9) above:

$$\text{(10) B.HP.} = \frac{\text{lb./min.} \times H_a}{33{,}000 \times E} = \frac{5{,}900 \times 7{,}526}{33{,}000 \times 0.76}$$

$$= 1{,}766$$

From Equation 14 and (7), (9), and I.R. Co. Calculated E

$$\text{(11) B.HP.} = \frac{5{,}900 \times 7{,}510}{33{,}000 \times 0.77} = 1{,}743$$

(12) Agreement of (10) and (11)

$$\frac{(1{,}766 - 1{,}743)100}{1{,}743} = 1.3 \text{ per cent}$$

$$\text{Efficiency} = \frac{\text{B.t.u. output}}{\text{B.t.u. input}}$$

$$= \frac{\text{B.HP.} \times 24 \times 2{,}545 \times 100}{\text{Gas C.F.D.} \times \text{B.t.u./cu. ft.}}$$

$$\text{(13) Efficiency} = \frac{1{,}743 \times 24 \times 2{,}545 \times 100}{740{,}000 \times 1{,}000}$$

(14) Efficiency = 14.4 per cent

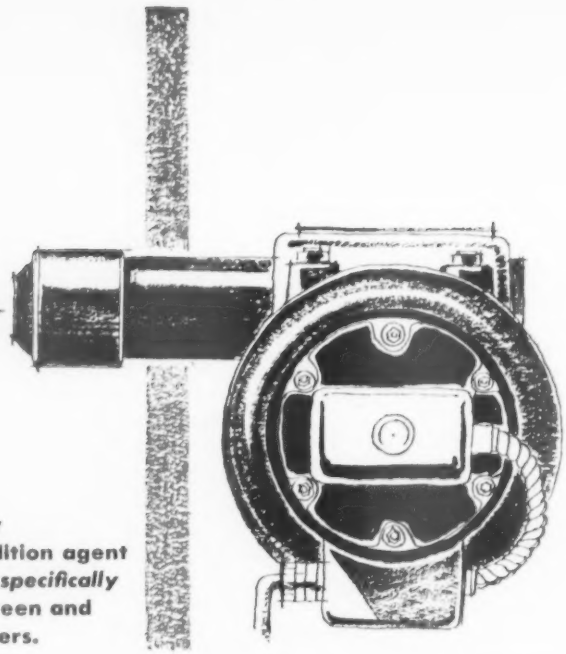
Adiabatic HP. output of the compressor is the B.HP. × efficiency

(15) From (11),

Adiabatic HP. = 1,743 × 0.77 = 1,340

Introducing...
SANTOLENE H

Stops Costly Screen and Filter Clogging of Oil Burners 4 Ways



SANTOLENE H is a newly developed Monsanto addition agent for distillate furnace oils *specifically designed* to overcome screen and filter clogging in oil burners.

1 **KEEPS FUEL OIL SLUDGE AND SEDIMENT LOW** by inhibiting progressive polymerization of unstable elements initially present in oil.

2 **REDUCES DEPOSITION** of sludge and sediment on burner parts by means of a unique surface action.

3 **INHIBITS RUST** and eliminates nearly all entrained rust at fuel oil burner.

4 **ELIMINATES OIL HAZE,** has no adverse effect on engine operation, is not subject to depletion by water extraction.

FOR MORE INFORMATION *send for Technical Bulletin O-87 to MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 800 N. Twelfth Blvd., St. Louis 1, Mo.*

SANTOLENE H

MONSANTO
CHEMICALS – PLASTICS

SERVING INDUSTRY...WHICH SERVES MANKIND

Santolene: Reg. U. S. Pat. Off.

research departments of Ingersoll-Rand Co. and Westinghouse Electric Corp. with calculations made from the field data for each selected run. Figs. 5a, 5b, and 5c graphically compare the calculated compressor efficiency by the horsepower graphs furnished with the turbine compressor unit, by the temperature - rise - efficiency calculations from actual temperatures obtained in operation, and from the factory calibration curve of the gas compressor.

It was explained to us by the research departments that the temperature-rise-efficiency method depends on a small difference in temperature which is difficult to measure accurately. A 1° F. error in reading makes about a 4 per cent error in the result. But, even with this fault, it is more consistent than the calculation of the turbine-power output, simply because there are fewer variables involved.

Determination of the turbine-power output is a function of air temperature and humidity, blade fouling in the air compressor, and many other factors quite difficult to evaluate in the field.

Appalachian Basin Reviving As Active Exploratory Area

(Continued from page 128)

Two wildcats are being drilled now in Lamar County—the W. T. Durant 1 Ogden, in Section 6-14s-15w, and the Paul Buchanan 1 Hankins, in Section 32-14s-14w. The Hankins well is drilling below 3,340 ft. and should be through the Mississippian into Devonian strata. It had such favorable oil shows in the Lewis sand (3,230-70 ft.) and in the Iowa lime (3,275-3,320 ft.) that the original operator, Otis D. Coston, of Birmingham, set 5½-in. casing and used 100 qt. of nitroglycerin in the sand in January, but to no avail. Lewis sand cores were taken from the well saturated with oil, but porosity averaged less than 5 per cent with only slight permeability.

Late developments . . . Union Producing Co. has completed a fourth gas well at Muldon field in Monroe County. The well had a calculated open-flow potential of 33,000,000 cu. ft. of wet gas daily. The condensate yield has not been calculated yet.

Carter Oil Co. is testing 1 McFadden in Clay County as a dual producer. Top perforations are at 3,894-3,906 ft. and 3,914-28 ft. in a Pennsylvanian sand. Lower perforations are at 8,614-33 ft. in the Carter sand of Mississippian age or possibly in an unnamed sand immediately above the Carter. It appears the well is testing for less than 4,000,000 cu. ft. daily from each of the two intervals. Both upper and lower zones are being hydraulically fractured.

Paul Buchanan 1 Hankins, Lamar County, Alabama, has been temporarily abandoned at a depth of 3,355 ft. in the Fort Payne limestone at the base of the Mississippian.

Additional wildcat locations include Marshall R. Young 1 J. N. Henderson, 22-15s-4e, Clay County, Mississippi, now drilling below 1,800 ft.; Shell-Feaszel 1 J. C. Gelling, 34-14s-6e, Monroe County, 2½ miles southwest of Aberdeen field, drilling below surface casing at 79 ft.; and Russell D. Paulk 1 E. B. Gaither-V. R. McMillen, 8-10s-9e, Itawamba County, rigging up.

Carter Oil Co. has set casing in 1 Fowler-Langley unit, 22-13s-2e, Chickasaw County. Total depth of the wildcat is 4,942 ft. in the Devonian topped at 4,380 ft. by samples. This well has prospects by sand-oil treatment of the Evans and Lewis sand zones of the Mississippian.

Walter E. Sistrunk 1 Gilmore Puckett Lumber Co., wildcat in 10-11s-8e, Itawamba County, was completed dry at 1,852 ft. in the Iowa zone of the Mississippian.

REDESIGNING YOUR PRODUCT?

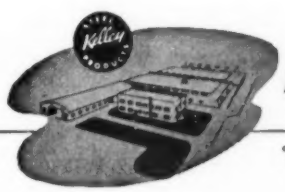
Bettmann Archives*

KELLEY CAN HELP YOU

Stamped, Formed, Shaped, and Drawn Metal

Kelley's engineers can help you to redesign your product. They can show you the savings from the use of formed metal shapes. The use of precision stampings saves hours of machine-time, while increasing the serviceability of your product. Kelley helps you with engineering and design, makes the necessary tools, and delivers the component stampings on time and to specification. The Kelley representative can show you savings that other Southwestern manufacturers have made by using Kelley formed metal shapes.

*This wire drawing plant in 1828 was operated by hand. The need for more wire and better wire led to the development of today's highly developed, automatic machinery.

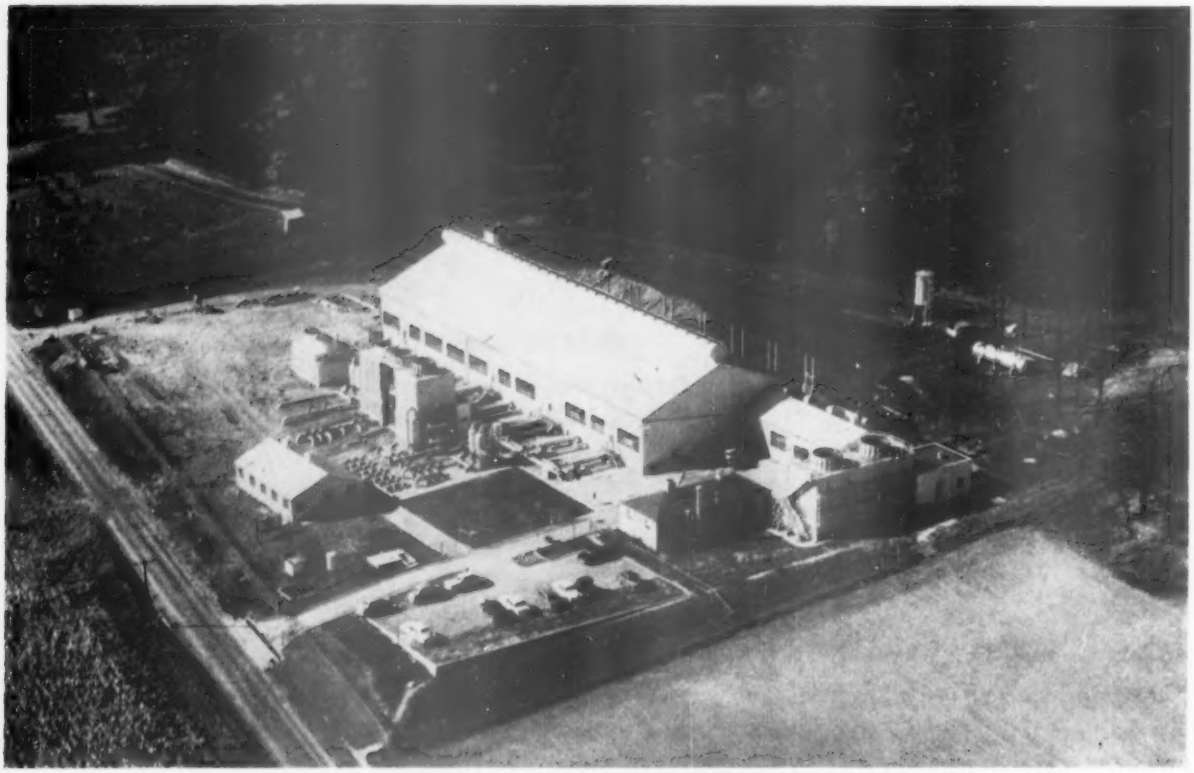


KELLEY MANUFACTURING COMPANY

WHOLESALE DISTRIBUTORS OF STEEL PRODUCTS MANUFACTURERS OF METAL STAMPINGS FOR INDUSTRY

GENERAL OFFICE, FACTORY AND WAREHOUSE, 4800 CLINTON DRIVE, HOUSTON
BRANCH OFFICES AND WAREHOUSE, 134 ELLIS BEAN STREET, SAN ANTONIO

P. O. BOX 17 HOUSTON, TEXAS



WEAVER COMPRESSOR plant of Ohio Fuel Gas Co., Richmond County, Ohio.

Ohio Fuel Gas' Weaver Project

Storage area can handle 55 billion cubic feet of gas, which is injected into 340 wells drilled to Clinton sand

ONE of the biggest underground natural-gas-storage projects in Ohio, that of Ohio Fuel Gas Co., is being developed further by the drilling of additional wells to increase deliverability of stored gas on peak days.

The over-all storage capacity served by the company's Weaver storage project, located in Richland County, is 55 billion cubic feet. A total of 340 injection wells are now in operation serving the area.

During a 12-month period, a total of 16½ billion cubic feet of gas was pumped into the ground through Weaver station. Last winter, during peak demand, as high as 235,356,000 cu. ft. daily of the fuel was withdrawn from the underground storage area.

The gas is injected into the Clinton sands, since they lend themselves more readily to underground gas storage. All gas stored in the project is purchased from interstate carriers delivering gas from fields of the U. S. Southwest.

New wells slated . . . Since the Weaver project is purely a storage field, all existing wells are injection wells and no production wells are located in the area. The contemplated drilling in the Weaver gas-storage area will therefore be limited to wells tapping the underground supply of stored gas. Each well drilled will thus increase deliverability of the stored gas on peak days.

Built in 1948 . . . The Weaver compressor plant was constructed in 1948, but latest installations of additional new compressor units was only recently completed. These include two vertical units rated at 1,500 hp.; four new horizontal twin-tandem engines each with rated capacity of 1,150 hp.; a horizontal twin-tandem engine with 2,700-hp. capacity; and two horizontal twin-tandems, with 5,400 hp. The station has a total capacity of 11,650 hp.

Catch fish with wire rope?

WICKWIRE ROPE — A CF&I PRODUCT

Yes, gentlemen, there's more fish caught with wire rope than ever nibbled at a baited hook. Satisfying America's appetite for nutritious seafood is a stupendous job, calling for fleets of fast, powerful trawlers that net their catches in prodigious quantities. To hold and haul in the heavily laden nets, the fishing industry annually uses millions of feet of wire rope.

There's a good chance the fish you eat comes to your table with the help of Wickwire Rope. Because, for over half a century, Wickwire Rope has "grown up" with the nation's fisheries. As in so many other activities where wire rope is used, the men who man the fishing fleets have a high regard for its strength and durability under the toughest conditions.

A YELLOW TRIANGLE ON THE REEL IDENTIFIES WICKWIRE ROPE

THE COLORADO FUEL AND IRON CORPORATION—Abilene (Tex.) • Denver
Houston • Odessa (Tex.) • Phoenix • Salt Lake City • Tulsa
THE CALIFORNIA WIRE CLOTH CORPORATION—Los Angeles
Oakland • Portland • San Francisco • Seattle • Spokane
WICKWIRE SPENCER STEEL DIVISION—Boston • Buffalo • Chattanooga
Chicago • Detroit • Emlenton (Pa.) • New Orleans • New York • Philadelphia

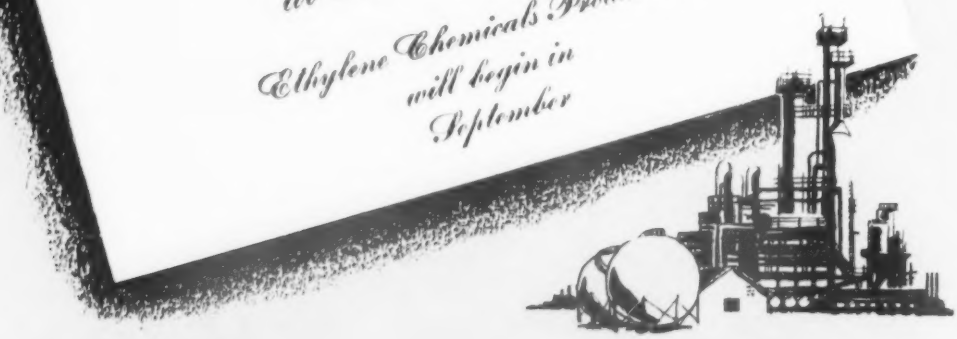
WICKWIRE ROPE

CF&I PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL AND IRON CORPORATION

1757

National Petro-Chemicals Corporation announces with pride Initial Production of LP-Gas from its plant at Tuscola, Illinois

Ethylene Chemicals Production will begin in September



A NEW SUPPLY of liquefied petroleum gas has become available through the opening of National Petro-Chemicals Corporation's giant natural gas stripping plant at Tuscola, Illinois. This is the first step in the completion of a $44 million project which will include the largest ethylene plant in the world. The ethylene will be used to make synthetic ethyl alcohol, ethyl chloride, and later the wonder plastic, polyethylene.

Located on the Baltimore & Ohio Railroad, at the junction of the natural gas pipe lines of the Panhandle Eastern Pipe Line Company and the Trunkline Gas Company, the plant will process 400 million cubic feet per day of natural gas. Daily production of propane, butane, isobutane, and natural gasoline will total 450,000 gallons, and will be distributed by the Phillips Petroleum Company, makers of "Philgas." Ethane recovery for the production of ethylene will amount to 10 million cubic feet per day.

Off-season storage for propane will be provided by a 6 million gallon underground cavern which will supplement conventional working storage consisting of 35 horizontal steel tanks each with a capacity of 50,000 gallons. Butane, isobutane, and natural gasoline will be stored in 4 Hortonspheres with a total capacity of 900,000 gallons.

Tank car shipments of LP-Gas will be handled at a 40-spot loading rack designed to load a day's production in 8 hours. Tank trucks will load 24 hours per day at 3 islands equipped with 6 propane spots and 3 spots each for butane, isobutane, natural gasoline.

Latest procedures in quality control and modern laboratory facilities have been incorporated to guarantee industry products that perform as specified.

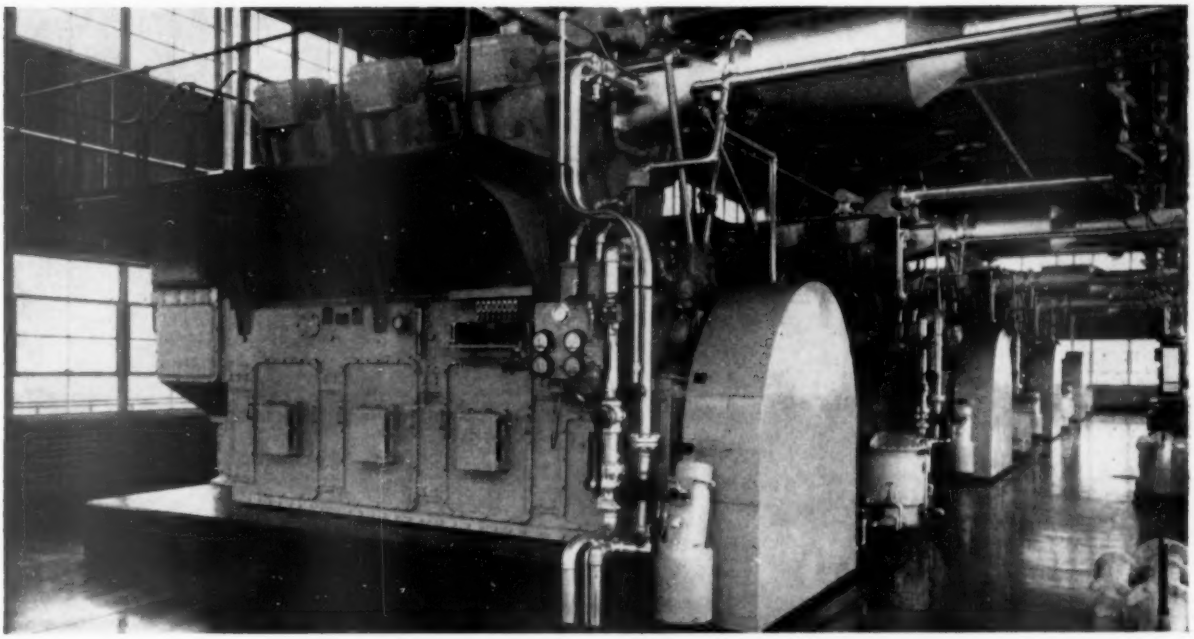
This new project has everything for the long-term contract user of bulk petro-chemicals. The future belongs to petro-chemicals. Why not let "PETRO" help you plan today for a better tomorrow!

NATIONAL PETRO-CHEMICALS

CORPORATION

A joint enterprise of National Distillers Products Corporation and Panhandle Eastern Pipeline Company

120 BROADWAY, NEW YORK 5, N. Y.



ONE OF TWO new vertical compressor units at Weaver station.

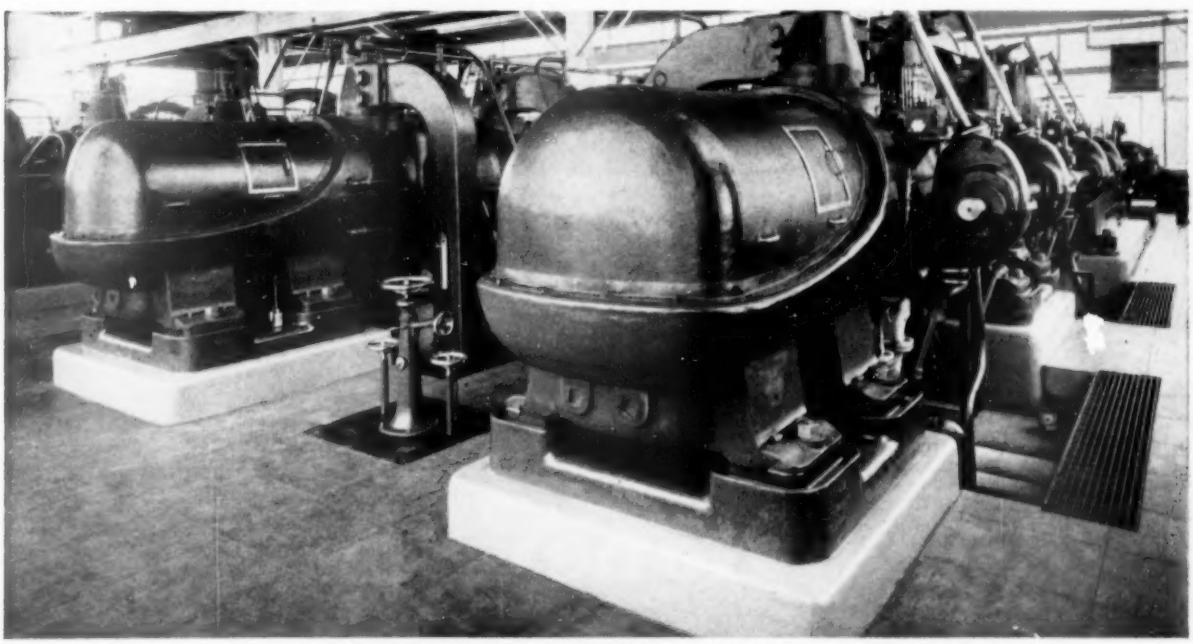
Thirty-eight employes keep the station running on a 24-hour basis.

Frank O'Leary is chief engineer at Weaver station. He formerly served at the company's old Crawford station at Sugar Grove, and started working for the firm in 1912.

Other veteran employes at Weaver include E. M. Shanks, with the company 39 years; G. W. Boals, who has had 38 years' service; A. H. Rush, 35 years with the company; Eldon Franks, 32 years with the company; and F. G. Hesson, who has served for 26 years.

Benton underground storage of natural gas in Hocking County, Ohio, was the first in the state, but Weaver storage followed shortly thereafter. The company's Hocking and Ashland projects have been in operation since 1936.

(Photos courtesy The Gasco News, publication of Ohio Fuel Gas Co.)



HORIZONTAL twin-tandem engines at Weaver, rated at 1,350 hp. each.

UNIFORM

Size
Strength
Finish

Seamless and Weldless, Larkin Bull Plugs and Swage Nipples provide uniform dependability wherever they may be used.

Larkin also furnishes Swage Nipples and Bull Plugs made from SAE 8620 (Refinery Alloy Steel) in sizes from ⅛" through 2".

LARKIN PACKER CO., INC.
ST. LOUIS, MO.

Specify...

LARKIN

...Through Your Supply Store

LARKIN WAREHOUSES: St. Louis, Mo. • Houston, Corpus Christi, Kilgore, Odessa, Wichita Falls, Texas • Oklahoma City, Tulsa, Oklahoma • Shreveport, Louisiana • Los Angeles, California • Great Bend, Kansas • Casper, Wyoming • New York, N. Y.

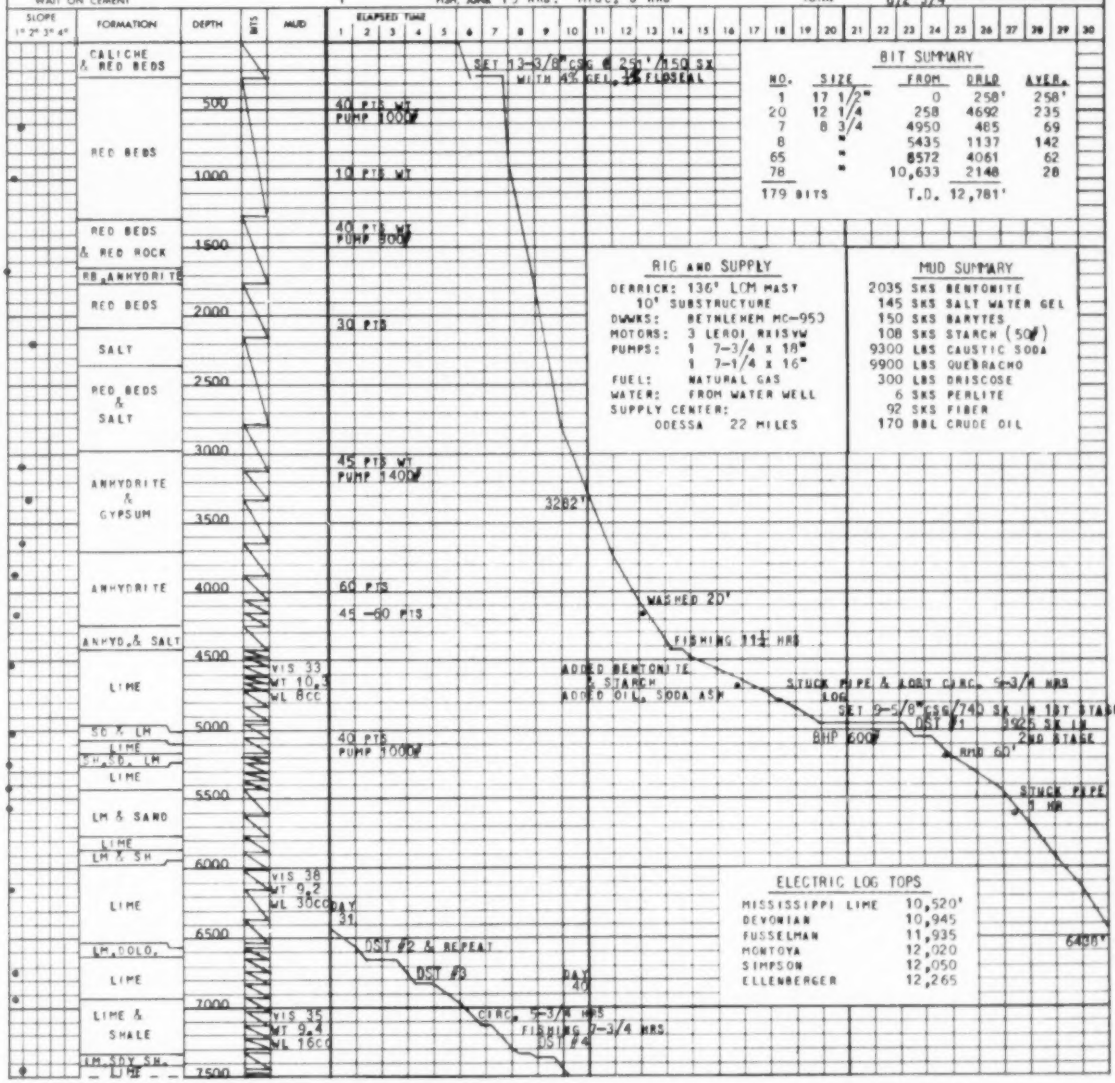
West Texas Drill Log

Contractor: Delta Gulf Drilling Co.
Operator: Anderson-Prichard Oil Corp.
Well: 24-1 Fasken.
Location: Section 24, Block 42, T-1N, G.&M.M.B. Survey, Andrews County, Texas.

	DEPTH	SIZE	DAYS
RIGGING UP			5
SURFACE HOLE	258'	17 1/2"	
REAMING			2/3
RUN SURF. CSG.	251'	13 3/8	
WAIT ON CEMENT			1
REAM INT. CSG.			
RUN INT. CSG. WOC	4942'	9 5/8"	2 5/6
RUN OIL STRING	12,779	5 1/2	1 1/3
WAIT ON CEMENT			1

	DAYS
RIG IN TO O.S. OR D&A	144
SPUD TO O.S. OR D&A	139
SURF. CSG. TO O.S. OR D&A	137 1/3
CO. DAYS TO O.S. OR D&A	28
TEARING DOWN	+ 1/3
TOTAL DAYS ON LOCATION	149
DOWN TIME, TOTAL	3 2/3
REPAIR 21 HRS. HOLE, MUD 47 HRS	
FISH, JUNK 15 HRS; MISC. 3 HRS	

DAYWORK	FEET	TIMES	HOURS
DRILLING			
CORING	50	2	79
LOGGING		2	65
D.S.T.		20	473 1/2
CIRCULATING		33	49 3/4
WAITING			5 1/2
(COMPLETING 3-2/3 DAYS)			
TOTAL			672 3/4



BIT SUMMARY

NO.	SIZE	FROM	DRLD	AVER.
1	17 1/2"	0	258'	258'
20	12 1/4	258	4692	235
7	8 3/4	4950	485	69
8	"	5435	1137	142
65	"	8572	4061	62
78	"	10,633	2148	28
179 BITS		T.D.	12,781'	

RIG AND SUPPLY

DERRICK: 136' LCM MAST
10' SUBSTRUCTURE
DWKS: BETHLEHEM MC-950
MOTORS: 3 LEROI, RAISVW
PUMPS: 1 7-3/4 x 18"
1 7-1/4 x 16"
FUEL: NATURAL GAS
WATER: FROM WATER WELL
SUPPLY CENTER:
ODESSA 22 MILES

MUD SUMMARY

2035 SKS BENTONITE
145 SKS SALT WATER GEL
150 SKS BARYTES
108 SKS STARCH (50#)
9300 LBS CAUSTIC SODA
9900 LBS QUEBRACHO
300 LBS DRISCOSE
6 SKS PERLITE
92 SKS FIBER
170 BBL CRUDE OIL

ELECTRIC LOG TOPS

MISSISSIPPI LIME	10,520'
DEVONIAN	10,945
FUSSELMAN	11,935
MONTOYA	12,020
SIMPSON	12,050
ELLENBERGER	12,265

(Compiled for The Oil and Gas Journal by Drilling Data Service, Oklahoma City)

UNIFORM

Size
Strength
Finish

Specify...

LARKIN

...Through Your Supply Store

Seamless and Weldless, Larkin Bull Plugs and Swage Nipples provide uniform dependability wherever they may be used.

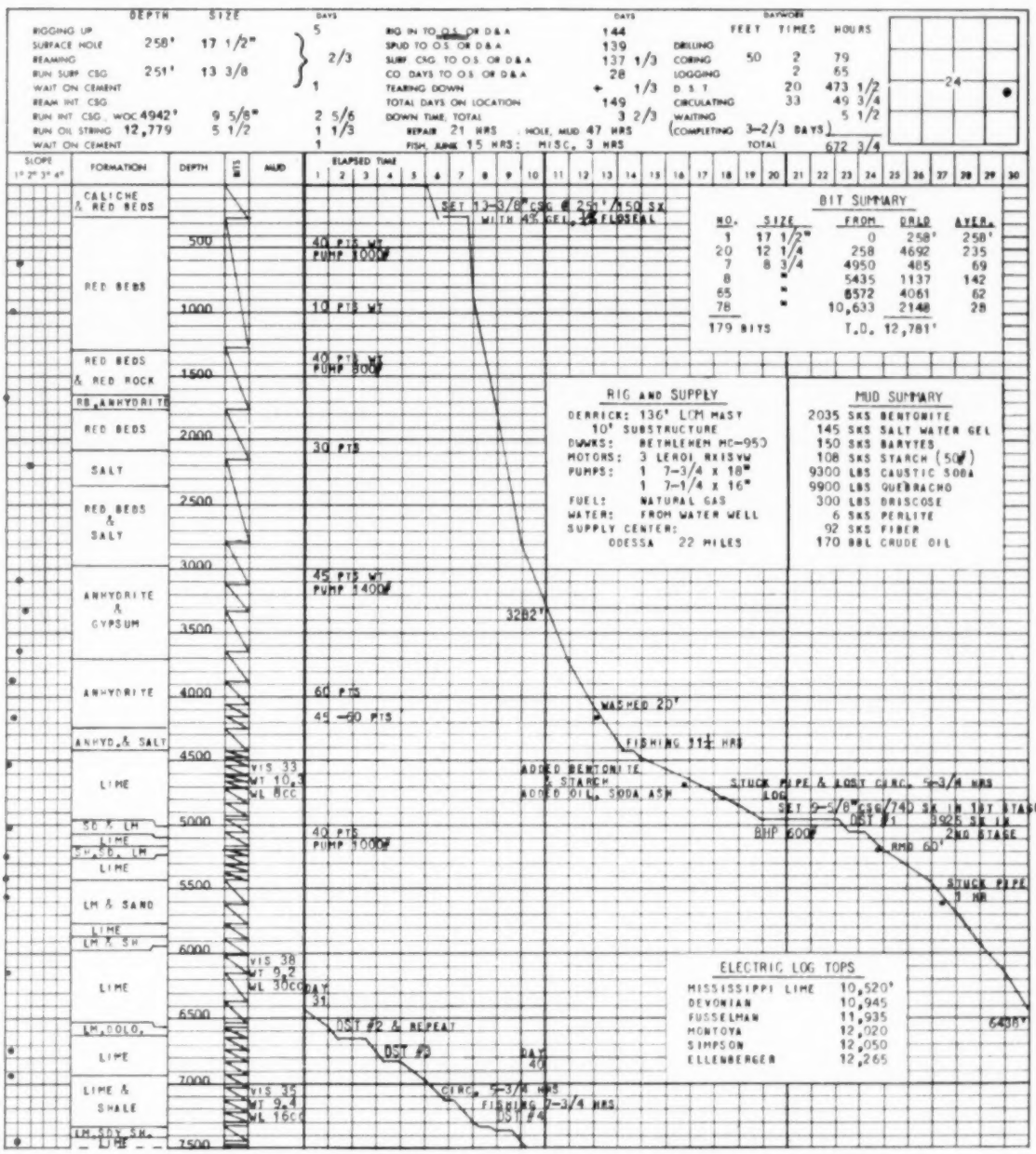
Larkin also furnishes Swage Nipples and Bull Plugs made from SAE 8620 (Refinery Alloy Steel) in sizes from ⅛" through 2".

LARKIN PACKER CO., INC.
ST. LOUIS, MO.

LARKIN WAREHOUSES: St. Louis, Mo. • Houston, Corpus Christi, Kilgore, Odessa, Wichita Falls, Texas • Oklahoma City, Tulsa, Oklahoma • Shreveport, Louisiana • Los Angeles, California • Great Bend, Kansas • Casper, Wyoming • New York, N. Y.

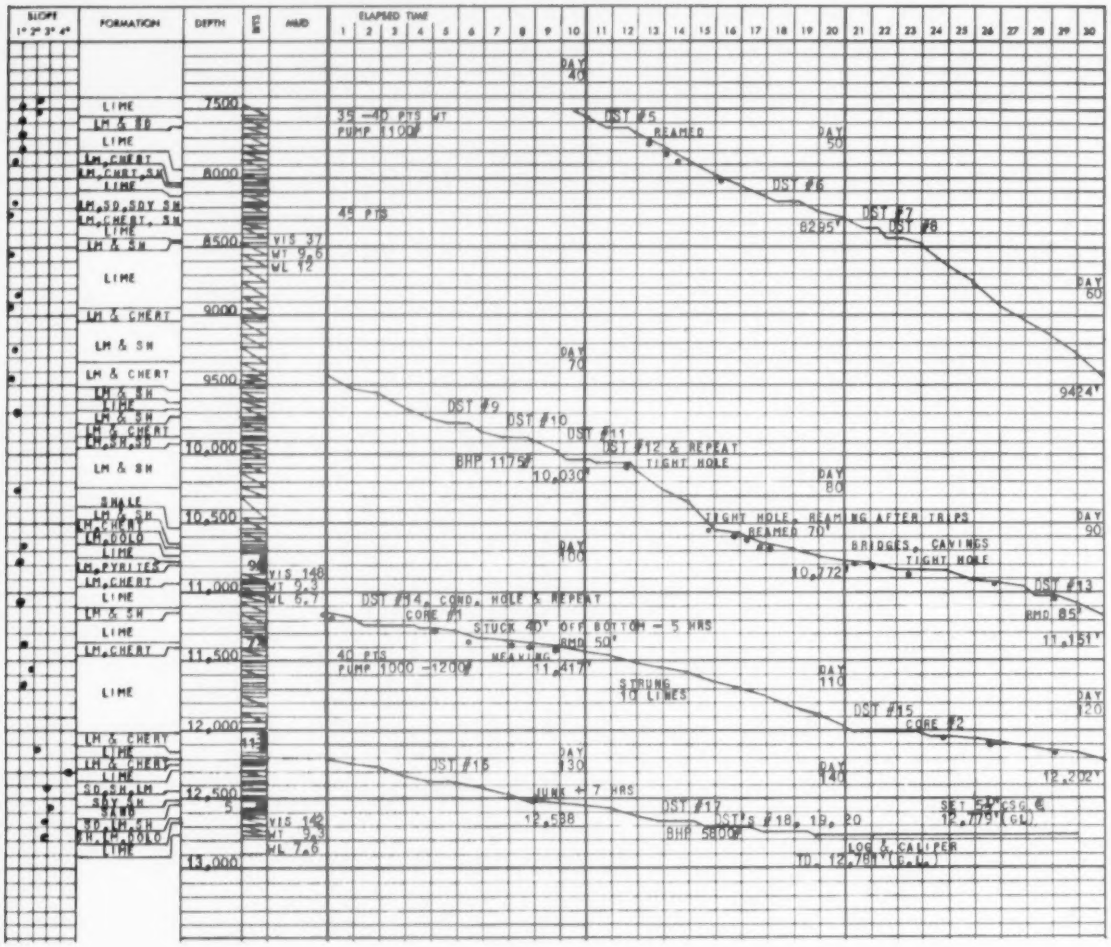
West Texas Drill Log

Contractor: Delta Gulf Drilling Co.
Operator: Anderson-Prichard Oil Corp.
Well: 24-1 Fasken.
Location: Section 24, Block 42, T-1N, G.&M.M.B. Survey, Andrews County, Texas.



(Compiled for The Oil and Gas Journal by Drilling Data Service, Oklahoma City)

West Texas Drill Log (Continued)



How to Make Sure Your Slings Are Safe—3

by Walter C. Richards*

FIRST two installments on this subject appeared in the issues of June 22 and July 6. Basic principles and seven charts showing capacities for various types of slings were presented.

Examples of Chart Usage

1. What is the rated capacity of a two-leg bridle sling made of ⅝-in.-diameter wire rope, where the conditions require that the legs be spread at an angle of 70°?

From Fig. 6 it will be seen that if the angle of spread between legs is 70°, the angle (B) that each leg makes with the horizontal (when in balance) is 55°. A stress of 2.3 tons (see first column of loads on Chart 1) could be safely applied to each leg, and 4.6 tons or 9,200 lb. total for the sling if used vertically. To determine the rated capacity at the required angle the figure 9,200 is multiplied by the factor 0.8192 shown in column C opposite the 55° horizontal angle. (Fig. 6.)

Required rated load W, at given angle of spread = rated capacity for two vertical ropes × factor in column C

= 9,200 × 0.8192
7,536 lb.

2. What diameter rope must be used in a two-leg bridle sling to handle 10,000 lb. when legs are spread at an angle of 80°?

As in the first example the chart will show that with the legs spread at an angle of 80° the horizontal angles would be 50° each. One-half the load or 5,000 lb. must be carried by each leg.

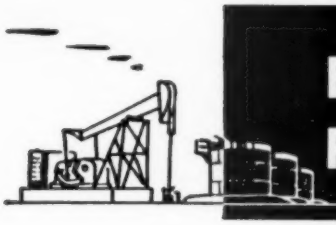
To calculate the tension developed in each leg by this vertical load of 5,000 lb., multiply the load by the factor in column D opposite the angle of 50°.

Tension T in one inclined leg = ½ total vertical load × factor in column D

= 5,000 lb. × 1.3054
6,527 lb.

Applying a factor of 7, a rope with a breaking strength of 45,689 lb. or 22.8 tons is required. This would indicate a ¾-in. 6 by 19 wire rope. Or from the first column under rated capacity it will be seen that to handle 6,527 lb. safely on a single leg, a ¾-in. wire rope is needed. (Fig. 1.)

*A. Leschen & Sons Rope Co.



ENGINEERING FUNDAMENTALS

ELECTRIC LOGGING—4

Complications Caused by Silt and Clay

by R. I. Martin*

WHEN a reservoir rock contains silt and clay which are themselves conductive, the simple proportionality $R_o = FR_w$ becomes more complex. The formation factor is no longer independent of the resistivity of the water saturating the pore space as in a clean rock saturated 100 per cent with water.

With two conductive media present, the resulting resistivity depends on the part played by each. When the concentration of the connate water is high, the low resistivity of the water is predominant. On the other hand, when the resistivity of the connate water is high, the relatively lower resistivity of the silt and clay becomes predominant.

Early practice in measuring formation factors was to use a dilute solution for saturating the rock. The reason for this was to have a liquid whose resistivity could be measured in a standard mud cell with reasonable accuracy. No thought was given to modifying the mud cell to make it suitable for measuring the resistivities of connate waters, and the idea of using graphs such as that shown in Fig. 1 of Installment 2 of this series did not seem to be accepted.

Patnode and Wyllie[1] investigated the possible relationship between the resistivity of the saturating water and the formation factor with the results mentioned previously. They expressed the relationship as follows:

$$\frac{1}{R_o'} = \frac{1}{R_t} + \frac{1}{R_o} = \frac{1}{R_p} + \frac{1}{FR_w}$$

where:

R_o' = over-all resistivity of the rock and contents
R_p = resistivity of the conductive solids
R_o = resistivity which the rock would have if it were clean
F = formation factor
R_w = resistivity of the water in the pore space

As the equation contains two unknowns, measurements of resistivity made with waters of two different salinities will afford a solution.

A thought might occur that it would be simpler to measure the formation factor using a saturating fluid resembling the connate water. This would be true if the only information needed were the water sand resistivity. At partial water saturations which occur in the pay zones the effects of these conductive solids are important. When the pay is invaded in the vicinity of the bore hole with mud filtrate having a resistivity different from that of the connate water the effects should be taken into account. Both of these cases will be considered later on.

De Witte[2] has criticized the work of Patnode and Wyllie on the grounds that the equation is based on parallel circuits with one representing the resistance of the water and the other the resistance of the conductive solids. This is untrue because the water and clay are in direct contact throughout a large portion of the rock. De Witte's criticism is therefore justified, but the alternative equation proposed by him is quite cumbersome, and requires more detailed knowledge than is usually available. When such information is available, then De Witte's equation should be used.

It would be advisable to interject some remarks at this point in order to maintain a sense of proportion. Variations in lithology both laterally and vertically are very common. A core plug or sample represents a random sample and may be different from a sample taken a few inches away. If large cores are used there are practical difficulties in cleaning them thoroughly and resaturating them uniformly. On the other hand most logging methods perform measurements on a substantial volume of formation so that a direct correlation between cores and log may not be obtained. In most cases, however, results average out surprisingly well. Even though such detailed research on cores may not appear to be justified at first sight, such work as is described, assists in obtaining a clearer idea of the fundamental factors involved.

More recently a paper by Winsauer, Shearin, Masson, and Williams[3] has appeared. These workers used 29 sand samples varying from Devonian to Oligocene in age. These samples had clay contents ranging up to 20 per cent but the experiments were carried out with reasonably high concentrations of salt in the water. Although the salinity is not reported, it was high enough that check measurements made with a lower salinity were not sufficiently different to cause concern. Even if their results apply only to normal salinity values and to relatively clean sands, they are of importance. A relation based on their work and checked against the data published by Archie, is:

$$F = 0.62\ P^{-2.15}$$

The obvious advantage of this equation is that it is no longer necessary to know the value of m, the exponent in Arche's original equation.

Inspection of the above equation shows that for a porosity of one, the formation factor will be less than one. Whether it is necessary to meet the boundary condition that the formation factor is equal to one when the porosity is equal to one is debatable. In practice, if the relation can be shown to be valid through a range of porosities from 5 to 40 per cent, the equation offers considerable possibilities and should be subject to further investigation. This equation is shown as the upper broken line in Fig. 1 of Installment 3 of this series. The lower broken line is a plot of $F = 0.62\ P^{-2}$. This is an easier calculation to make, but for large values of F gives appreciably lower values.

*Assistant professor of petroleum engineering, Missouri School of Mines and Metallurgy.

References

1. Patnode, H. W., and Wyllie, M. R. J., "The Presence of Conductive Solids in Reservoir Rocks as a Factor in Electric-Log Interpretation," Trans, A.I.M.E., 189, pp. 47-52.

2. De Witte, L., "Resistivities and Fluid Contents," The Oil and Gas Journal, August 24, 1952, p. 120.

3. Winsauer, W. O., Shearin, H. M., Masson, P. H., and Williams, M., "Resistivities of Brine Saturated Sands in Relation to Pore Geometry," Bull. A.A.P.G., 36, No. 2, pp. 253-277.

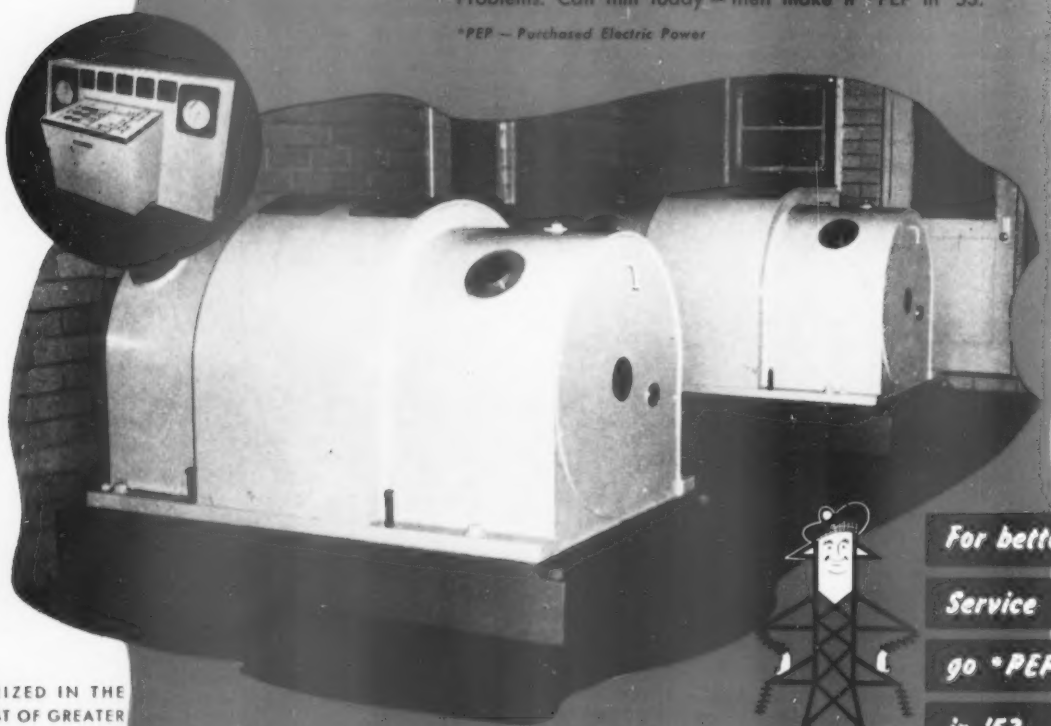
NO DIRT
NO GREASE
NO GRIME
WITH L C P...

ANOTHER *Electric Power* CASE HISTORY

Electric Power

Look how much cleaner the operation is at this Pipeline Booster Station utilizing Purchased Electric Power. These 1000 HP motors are operating more efficiently day after day and will give longer trouble-free life because of dependable, economical, safe Low Cost Purchased Electric Power. Let Electric Power go to work for you. There's a Power Engineer at your nearest Electric Power company who can give you the answers to your Power Problems. Call him today — then make it *PEP in '53.

*PEP — Purchased Electric Power



For better Service go *PEP in '53

ORGANIZED IN THE INTEREST OF GREATER SERVICE TO THE PETROLEUM INDUSTRY

Our 25th Year

Petroleum Electric Power Association

CALL YOUR NEAREST ELECTRIC SERVICE COMPANY FOR MORE FACTS OR ADDRESS YOUR REQUEST TO P. O. BOX 2771, DALLAS, TEXAS

by W. L. Nelson
Technical Editor

QUESTIONS ON TECHNOLOGY

Volume Equivalent of Various Grades of Natural Gasoline

"Statistics of natural-gasoline-plant capacities do not state the kind or grade of gasoline. What is meant by such statistics?"—W.S.T.

Natural-gasoline statistics usually represent a Grade 26-70 product. In about 1931, when the present grading system, which employs vapor pressure and percentage evaporated at 140° F., was adopted, the following factors for estimating prices of the various grades of gasoline were suggested:

12 R.v.p. and lower	1.471
14 R.v.p. gasoline	1.362
18 R.v.p.	1.258
22 R.v.p.	1.129
26 R.v.p.	1.000
30 R.v.p. and above	0.896

The factors were also used to convert volumes of the various grades to the equivalent volume of Grade 26-70 gasoline, and they or similar factors are still used by the Natural Gasoline Association of America (N.G.A.A.), the U. S. Bureau of Mines, etc., for this purpose. Thus, 1,000 gal. of an 11 or 12-R.v.p. gasoline is the equivalent of 1,471 gal. of Grade 26-70 gasoline. Although the average gasoline manufactured today no longer has a vapor pressure of 26 (being about 18 R.v.p.), statistics are still stated on the basis of Grade 26-70. Prices are no longer estimated by the factors stated above.

The factors are simply the ratios of the amounts of butane-free base material contained in each of the gasolines. Thus, for the 12-R.v.p. gasoline mentioned above which contains 100 per cent of base material (no butane) and the 26-70 grade which contains about 68 per cent base material (32 per cent butanes), the factor is:

$$100 \div 68 = 1.471$$

The use of such factors for equivalent volumes involves the assumption that butanes are not salable as such but can only be sold as a part of natural gasoline. This is only partly true because statistics of butanes sales are also recorded and this duplication of butane quantities (i.e., as butane but also as part of hypothetical Grade 26-70) results in totals that are somewhat too large.

Typical gasoline compositions and their factors are shown in Table 1, as well as the somewhat accepted factors of the N.G.A.A. Gasolines representing the average of each grade are also shown but such gasolines are not representative of the gasolines actually sold because the

TABLE 1—RELATIONSHIP BETWEEN COMPOSITIONS OF THE VARIOUS GRADES OF (PROPANE FREE) NATURAL GASOLINES

Identification of gasoline—	R.v.p.	Per cent evaporated at 140° F.	Vol. per cent† Butanes and lighter	Base stock	Volume relative to 26-70 grade	Gallons, equiv. to 1 gal. 26-70 gasoline
12 R.v.p. (N.G.A.A.)	12.0 and lower		none	100.0	**1.47**	**0.68**
Average Grade 14-25	12.0	32.5	6.5	93.5	1.37	0.73
Average Grade 14-40	12.0	47.5	4.5	95.5	1.40	0.715
Average Grade 14-55	12.0	62.5	3.0	97.0	1.425	0.70
Average Grade 14-70	12.0	77.5	1.0	99.0	1.455	0.685
14 R.v.p. (N.G.A.A.)	14.0				**1.36**	**0.735**
Typical Grade 14-25	13.5	35.0	11.0	89.0	**1.31**	**0.765**
Typical Grade 14-40	13.5	47.0	9.0	91.0	**1.34**	**0.745**
Typical Grade 14-55	13.5	60.0	7.5	92.5	**1.36**	**0.735**
Average Grade 18-25	16.0	32.5	16.5	83.5	1.23	0.815
Average Grade 18-40	16.0	47.5	14.0	86.0	1.265	0.79
Average Grade 18-55	16.0	62.5	11.5	88.5	1.30	0.77
Average Grade 18-70	16.0	77.5	9.0	91.0	1.34	0.745
18 R.v.p. (N.G.A.A.)	18.0				**1.26**	**0.795**
Typical Grade 18-40	17.5	50.0	17.0	83.0	**1.22**	**0.82**
Typical Grade 18-55	17.5	62.0	15.0	85.0	**1.25**	**0.80**
Typical Grade 18-70	17.5	75.0	13.0	87.0	**1.28**	**0.78**
Average Grade 22-25	20.0	32.5	*25.0	*75.0	*1.10	0.91
Average Grade 22-40	20.0	47.5	22.7	77.3	1.14	0.88
Average Grade 22-55	20.0	62.5	20.4	79.6	1.17	0.855
Average Grade 22-70	20.0	77.5	18.3	81.7	1.20	0.835
22 R.v.p. (N.G.A.A.)	22.0				**1.13**	**0.885**
Typical Grade 22-40	21.5	50.0	25.5	74.5	**1.10**	**0.91**
Typical Grade 22-55	21.5	62.0	24.0	76.0	**1.12**	**0.89**
Typical Grade 22-70	21.5	77.0	22.0	78.0	**1.15**	**0.87**
Average Grade 26-25	24.0	32.5	*34.0	*66.0	*0.97	*1.03
Average Grade 26-40	24.0	47.5	*32.0	*68.0	*1.00	*1.00
Average Grade 26-55	24.0	62.5	30.0	70.0	1.03	0.97
Average Grade 26-70	24.0	77.5	28.2	71.8	1.05	0.95
26 R.v.p. (N.G.A.A.)	26.0				**1.00**	**1.00**
Typical Grade 26-55	25.5	65.0	33.0	67.0	**0.98**	**1.02**
Typical Grade 26-70	25.5	77.0	32.0	68.0	**1.00**	**1.00**
Average Grade 30-25	28.0	32.5	*41.5	*58.5	*0.86	*1.16
Average Grade 30-40	28.0	47.5	*40.0	*60.0	*0.88	*1.135
Average Grade 30-55	28.0	62.5	39.0	61.0	0.90	1.11
Average Grade 30-70	28.0	77.5	37.9	62.1	0.91	1.10
Typical Grade 30-55	29.5	65.0	*42.5	*57.5	*0.84	1.19
Typical Grade 30-70	29.5	80.0	41.5	58.5	**0.86**	**1.16**
30 R.v.p. (N.G.A.A.)	30.0 and above				**0.90**	**1.11**
Average Grade 34-25	32.0	32.5				
Average Grade 34-40	32.0	47.5	*49.5	*50.5	*0.74	*1.35
Average Grade 34-55	32.0	62.5	*49.0	*51.0	*0.75	*1.33
Average Grade 34-70	32.0	77.5	47.8	52.2	0.77	1.30

*Approximations which required extrapolation of charts. Such stocks are rare and are blends rather than natural products. †From Fig. 254 of the third edition of Petroleum Refinery Engineering, McGraw-Hill Book Co., Inc., New York, 1949.

plant operator usually likes to incorporate as much butane as possible into the gasoline. This leads to vapor pressures near the upper limit of the grade rather than the average vapor pressure of the grade.

Factors in Long-Term Crude Contracts

"What factors are used in stating the price of crude oil throughout a long-term contract? The oil is to be transported by sea."—R. F. D.

The basic price of the crude oil, if such a price is not posted, can be adjusted by ratio to the price of some comparable crude oil for which prices are posted. The other main consideration is the cost of transportation. Changes in the tanker rate can be governed by the USMC (U. S. Maritime Commission) rates but since actual tanker rates usually range somewhat above or below USMC rates (lowest rates in 1952 were about USMC—15 per cent), the tanker rate is sometimes corrected by the use of average wage rates, wholesale price indexes, and the cost of fuel oil.

Thus, the current transportation cost (T.C.) can be related to the basic transportation cost (B.T.C.) as follows:

$$T.C. = B.T.C. (0.35\ W/W_B + 0.20\ F/F_B + 0.15\ M/M_B + 0.30)$$

which contemplates that the transportation cost consists of 35 per cent labor and 20 per cent fuel or power, and depends to the extent of 20 per cent on wholesale prices. A factor might also have been included for the current cost of tankers or marine equipment. The meanings of the symbols or terms are:

Base price . . . The posted price of crude oil at some suitable point such as Venezuela, Ras Tanura, or the Gulf Coast should be corrected for variations in gravity at the customary rate of 2 cents per degree A.P.I., or a similar factor based upon the prices of refined products at the port of destination. The development of a proper factor involves a consideration of refinery-processing methods and realizations of the refined-product-value of the crude oil.

B.T.C.—Basic transportation cost. . . The most widely used tanker cost is that of the USMC less or plus a percentage depending upon the availability of tankers. The formula given herein contemplates the adoption of a fixed B.T.C. at the beginning of the contract which is corrected currently for changes in the cost of fuel, cost of living, or wage rates. It would not be proper to use the various USMC rates as they are posted and also to correct for changes in costs because presumably the latest postings of the USMC reflect these same variables (although in addition it reflects the availability of tanker vessels).

W and W_B wages . . . Ratios may be obtained from wage rates for skilled workmen published each month in Engineering News Record, in the magazine entitled Survey of Current Business, or from the "Hours and Earnings Industry Report" of the U. S. Bureau of Labor Statistics.

F and F_B fuel . . . Prices of fuel oil from Platt's Oilgram or the National Petroleum News for oil sold near the point of embarkation can be used. Thus, in shipping from the Middle East, prices at Ras Tanura would be significant, or from the Caribbean, such prices as those at Curacao or prices based upon those of the Gulf Coast of the United States.

M and M_B—Cost of living . . . The Wholesale (Primary Market) Price Index of the U. S. Bureau of Labor Statistics is probably the most widely accepted cost of living index.

Finally, the currency that is to be used must be considered carefully, and in some instances, clauses pertaining to relationships or limits that will call for the adoption of a new currency medium, are advisable.

Significance of Viscosity Index

"What is the real usefulness of viscosity index? Does it keep the engine from wearing?"—M. W. P.

The basic theory underlying viscosity index is that an oil that has a high viscosity index will be viscous enough at high temperatures in the engine to insure lubrication and be thin enough at low temperatures to insure easy starting of the engine. In actuality, the viscosity of petroleum lubricating oils, even with viscosity-index additives, changes so rapidly with temperature that the two basic requirements cannot be completely attained.

Ease of starting at very low temperatures requires very thin oils, regardless of their viscosity index. This is illustrated in Table 1 which shows that in mild climates any viscosity index is satisfactory, whereas in severely cold climates (—20 and lower) no straight petroleum oils are satisfactory because of their low viscosity index.

Stated in another way, viscosity (or S.A.E. grade) is much more powerful than viscosity index in lowering the temperature of easy starting. Table 1 is based on a summary of all available information taken from Dewdney et al., Third World Petroleum Congress, Section VII, p. 413, and on Table 2 which was taken from Fleming, et al., S.A.E. Trans., July 1950.

Thus, there have been tendencies to reduce the viscosity of motor oils (the latest being S.A.E. 5W which as a maximum viscosity at 0° F. of 4,000 S.U.S.), and an increased search for high-viscosity-index synthetic lubricating oils. There is a limit, of course, to the use of thin or low viscosity oils because of lubricating failure. However, the load-carrying capacity of S.A.E. 5W oil can be made substantially equal to that of S.A.E. 30W oil by the addition of film-strength and antiwear agents.

TABLE 2—APPROXIMATE OIL VISCOSITIES FOR BORDERLINE STARTING OF AN AVERAGE PASSENGER CAR

Temp. at startup (°F.)	Extrapolated viscosity, S.U.S. for borderline starting	References
10	33,000	(*)
0	25,000-30,000	(*), (†), (‡)
—10	18,000-22,000	(*), (‡), (§)
—20	14,000-15,000	(*), (¶)
—25	5,000	(¶)

*Blackwood, 1935. †Blackwood and Rickles, 1931. ‡Upham and Mougey, 1948. §Larson, 1931. ¶Esso Labs.

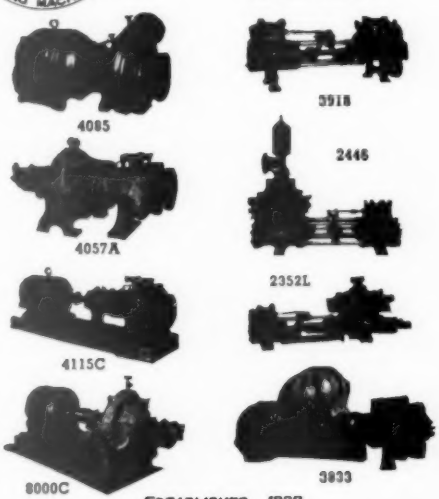
TABLE 1—VISCOSITY INDEXES (APPROXIMATE) NEEDED TO ATTAIN FAST STARTING

S.A.E. grade	—Viscosity indexes at these operating temperatures—					
	—20	—10	0	10	20	30
5W	80	0	low	low	low	low
10W	120	70	10	low	low	low
10W	125	90	40	low	low	low
20W	145	120	85	40	low	low
30W	150	130	115	90	55	low
40W	150	140	130	110	90	50

PUMPS

CENTRIFUGAL
RECIPROCATING

BUILDERS OF OUTSTANDING PUMPS
Since 1869



ESTABLISHED 1869

DEAN BROTHERS PUMPS INC.
INDIANAPOLIS IND.
323 W. TENTH ST.

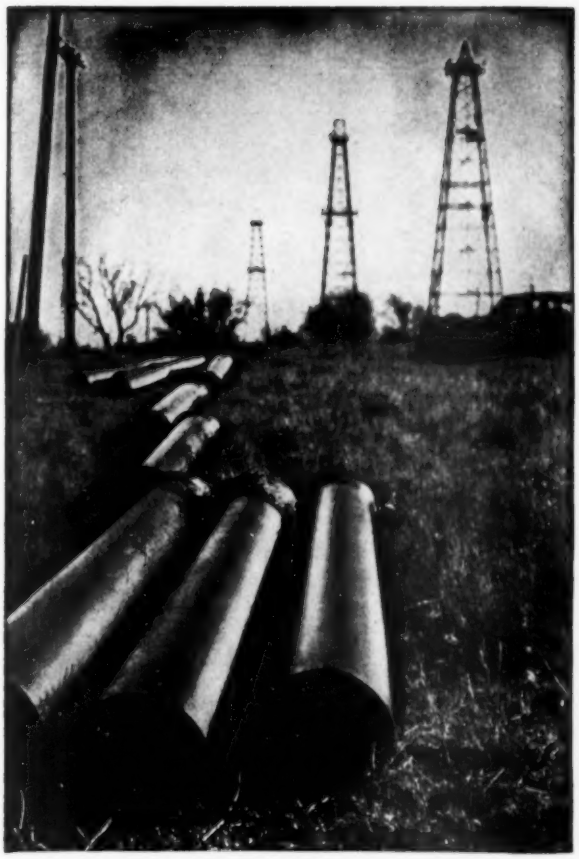
KAMLOK
COUPLING ASSEMBLIES

The Fastest, Surest Coupling Known

KAMLOK Couplings combine *speed, perfect performance, durability*—three features that are indispensable. *Fastest!* Perfectly tight, safe connection *in seconds*, by sliding coupler over adaptor, and pressing cam levers. KAMLOKS couple and uncouple *instantly*, regardless of "hookup." *Efficient!* No wasted *time—effort*, achieving leakproof-tight connection that guarantees consistently safe operation at peak efficiency. *Long-lasting!* Made of hard wear-resistant bronze to 3". 4" size of OPALUMIN, as strong as bronze, only ⅓ the weight. KAMLOKS add extra life to hose.

Write for Bulletin F-3

OPW CORPORATION
VALVES, FITTINGS, ASSEMBLIES
for handling hazardous liquids
2731 COLERAIN AVE. • CINCINNATI 25, OHIO
DALLAS OFFICE: 2421 Commerce St., Dallas 1 Texas



AN OLDTIME RECIPE FOR LONG-LIVED PIPE LINES

A recipe that waterworks and gas distribution engineers have used for over a century is: *specify cast iron pipe.* Refinery engineers have used it, too—with good success—for run-down, water and gasoline lines—for fire protection systems—salt water disposal—condenser and cooling coils.

No other pipe, at reasonable first cost, offers comparable resistance to both interior and exterior corrosion. No other pipe, in its price range, is as economical in the end. Available with bell-and-spigot, plain end and flanged, or with standardized mechanical joints. Cast Iron Pipe Research Association, Thomas F. Wolfe, Engineer, 1015 Peoples Gas Bldg., Chicago 3, Illinois.

CAST IRON PIPE
FOR LONG LIFE AND ECONOMY

EQUIPMENT MEN . . . in the News

Daniel Orifice Announces Several Staff Changes

Daniel Orifice Fitting Co., Los Angeles, has announced the appointment of William R. Henry as district

W. R. HENRY

W. C. WATSON

manager of West Texas, with headquarters at the company's sales offices and warehouse at Odessa.

W. C. (Bill) Watson has joined the Daniel sales force at Odessa.

M. FREUDENTHAL

J. R. WILSON

Daniel has also announced the recent move of its sales office from Fort Worth to Dallas. In charge of the new Dallas office will be Merton Freudenthal.

J. R. Wilson is the new member of the Daniel sales staff at Los Angeles.

A graduate engineer of University of Texas, Henry spent several years in the engineering department at the main offices and plant in Los Angeles before transferring to sales.

Watson is well known in the Odessa area, having lived in Odessa for several years before moving to Houston. He was formerly associated with W.K.M. Co., and the industrial-valve division of Cameron Iron Works.

Before his transfer to sales, Freudenthal worked in the Daniel engineering department in Houston for 3 years.

For the past 5 years, Wilson has been technical assistant in Texas Pipe Line Division of Southern Counties Gas Co. of California.

Preventcote To Be Sales Company for ParAnCor

ParAnCor Co., Denver, manufacturer of anticorrosives and protective coatings, has completed separation of its manufacturing operation and sales organization into two independent units.

Preventcote Co., Inc., will, in the future, handle all sales engineering consultation, inquiries, and service pertaining to ParAnCor and allied anticorrosive products.

M. C. Crouch, Jr., is president of the new sales firm. Other officials are: W. C. Bradsher, formerly with General Iron Co.; Kenneth C. Reed, formerly a corrosion engineer with Public Service Co. of Colorado; and Michael Zangara, formerly with Quickway Shovel Co. Bradsher will be office manager of the new firm and Reed and Zangara will serve as sales engineers.

Studdard is New Mustang Tractor Sales Manager

EARL STUDDARD

Appointment of Earl Studdard as sales manager has been announced by Otis Massey, president of Mustang Tractor & Equipment Co., Houston, Caterpillar distributor for Southeast Texas

Studdard has been associated with various Caterpillar distributors since 1945. Former sales manager of Stribling Brothers, Greenwood, Miss., Studdard is well qualified for this position.

W. O. Cook Named Vice President, Ideco Division

J. B. O'Connor, executive vice president, Dresser Industries, Inc., Dallas, has announced the elevation of W. O. Cook to a vice president of the Ideco Division.

W. O. COOK

Cook joined Ideco in 1934 as design engineer and from 1940 to 1946 was director of engineering. He was appointed assistant general manager and later succeeded Richard R. Bloss as general manager of Ideco's manufacturing plant at Beaumont. In his new capacity, he will continue to serve as general manager in charge of Ideco's Beaumont plant.

Oilwell Announces Changes In Ohio-West Virginia Area

Two appointments in the Ohio-West Virginia district have been announced by C. H. Maynard, area manager for the Oil Well Supply Division of United States Steel.

James A. Durham, formerly manager of the Oilwell store at Charleston, W. Va., has been appointed district

Anglo-Iranian Group Visits Mission Plant

A group of employes of Anglo-Iranian Oil Co. visited Houston recently and toured the plant of Mission Manufacturing Co. They are pictured looking over stocks of Mission Super Chrome rods and inspecting the containers in which the rods are packed for shipping. Left to right are A. T. Churchhill, R. W. MacFarlane, D. MacGilp, G. E. Rogers, R. H. Hewitt, and T. B. Wilson.

representative, refinery and pipe-line sales, and will headquarter at Charleston. Succeeding Durham as Charleston store manager will be Carl R. Nelson, who has worked in the store since 1951. Durham entered the employ of Oilwell in 1941. Nelson also started work for Oilwell in 1941.

Shand & Jurs Expands New York Facilities

R. F. LEY

Shand & Jurs Co., Berkeley, Calif., manufacturers of petroleum tank fittings, who for the past decade has maintained its New York headquarters at 295 Madison Avenue, has just moved to greatly enlarged quarters at 342 Madison Avenue.

The move was made necessary by the increased personnel required to handle an increasing volume of business, not only with domestic producers but with a large number of foreign producers as well.

Shand & Jurs operates its principal plant in Berkeley and its fittings are also produced under license by Whessoe, Ltd., at Darlington, County Durham, England. Since 1935 the New York offices of the firm have been managed by Ralph F. Ley, with Joseph T. Drumm as assistant manager.

Associated Equipment Will Market Specialty Products

Chartered recently, Associated Equipment, Inc., of Houston, has announced its formal opening for business. The company has been formed by J. Daviss Collett as president and Orville E. Haley as vice president for the purpose of developing and produc-

J. D. COLLETT

O. E. HALEY

ing oil-field specialty products. The company is now ready to market the first of these products, a new accoustical fluid-level recorder.

Collett, who is also associated with Associated Engineers, Inc., graduated

ACCO products

HELICOID GAGES

FOUR HELICOID FEATURES

1. Stainless Steel Helicoid Roller (no gear teeth)
2. Stainless steel hair spring
3. Long Life Cam (no gear teeth)
4. Corrosion-resistant link and screws

Why HELICOID Gages...

retain original accuracy longer, last longer, and cost less per gage, per year

NO GEARS, NO TEETH

● HELICOID is the greatest achievement of the gage makers' craft—the pressure or vacuum gage *without gears... without teeth!* The HELICOID movement is a simple cam and roller device that gives long, trouble-free service. It has been tested and proved in years of hard service in the field.

HELICOID Gages are particularly desirable where pressures fluctuate and cause excessive movement and wear of gears in ordinary gages. The smooth operation of the durable HELICOID cam and stainless steel roller keeps the pointer as steady as it was originally even after hundreds of thousands of cycles.

Many sizes, many styles

You can get HELICOID Gages for pressure, vacuum, or compound service—in all pressure ranges; white, black, or radiant faces; wall, stem, flush, and panel mountings, or flangless cases.

ACCO

See your distributor or write today for **Catalog G-2**

HELICOID GAGE DIVISION
AMERICAN CHAIN & CABLE
929 Connecticut Avenue • Bridgeport 2, Connecticut

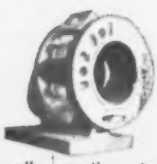
HELICOID Pressure • Vacuum GAGES

Weld "difficult" steels with little or no pre-heat!

use P&H LOW-HYDROGEN ELECTRODES

P&H has the industry's most complete line of low-hydrogen electrodes — many custom-built to match the chemical analysis or heat-treating properties of a variety of alloy steels. Being hydrogen-free, these electrodes eliminate underbead cracking — little or no pre-heat is needed to get high-strength welds on problem steels, steel castings, nickel-alloy steels, chrome-moly steels, .40 carbon castings, high-hardenable steels, aircraft and similar steels. There are other important advantages, too — for example, lower cost, compared to stainless-steel electrodes formerly used on many jobs. Ask your P&H representative or distributor for all the facts. Or write for bulletin 5-26.

Chrome-moly header, typical of high-pressure, high-temperature applications.



Low-alloy casting, typical of applications where physical properties must be matched.

Alloy gear rim, typical application matching heat-treating properties of parent metal.

Excavator body, typical of heavy sections welded with P&H Low-Hydrogen Electrodes.

P&H WELDING DIVISION
HARNISCHFEGER CORPORATION
4527 W. National Ave. • Milwaukee 46, Wisconsin

the P&H Line

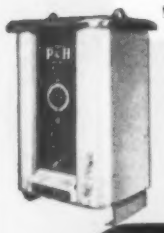
2495

P&H

WELDING HEADQUARTERS

—that's where you find cost-cutting answers to welding problems

P&H AC WELDER



Any heat at your fingertips — right at the work — with Dial-lectric Instantaneous Remote Control. Sizes up to 625 amps., NEMA rated. Connectable to 220 and 440 volts.

P&H WELDING TWINS

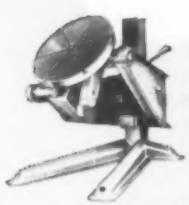
P&H DC RECTIFIER WELDER

Right now —at the work — fingertip Dial-lectric Control gives you the heat you need. Three sizes, 200, 300, and 500 amps., NEMA rated.

P&H WN-301 *Engine-Driven* DC ARC WELDER

It's portable—weld anywhere, anytime. Dial-lectric Control gives you fingertip heat control at the work — for faster, better welding. Runs at only 1750 rpm. Welding service range, 60-375 amps., NEMA rated.

P&H POSITIONERS



One finger is enough to position heavy weldments for economical downhand welding. Capacities from 2500 to 36,000 lbs. — remote-control and hand-operated models.

Ask your P&H representative or distributor for complete information, or write for free bulletins.

P&H WELDING DIVISION

HARNISCHFEGER CORPORATION

4527 West National Ave., Milwaukee 46, Wis.

2495A

from University of Oklahoma in 1932 with a P.E. degree. He was with Atlantic Refining Co. as an engineer until 1937, when he established a consulting firm. Both Associated Engineers, Inc., and Associated Equipment, Inc., have been outgrowths of this firm.

A specialist in seismic electronics since 1934, Haley attended Hardin Simmons University. After the war, he spent 6 years with McCollum Exploration Co. developing a process of adapting radar for offshore surveying. Haley later became associated with Electro Technical Labs designing geophysical instruments.

In addition to the accoustical fluid-level recorder, they are developing other products which they plan to introduce shortly.

W. F. Goertz Named General Sales Manager of Axelson

W. F. GOERTZ

Willard F. Goertz has been named general sales manager of Axelson Manufacturing Co., Los Angeles, division of Pressed Steel Car Co., Inc., it has been announced by John I. Snyder, Jr., chairman of the board and president of Pressed Steel Car Co.

Joining Axelson petroleum equipment division soon after graduation from U.C.L.A. in 1927, Goertz has served continuously with the company since then, working his way through a series of promotions from his first job, oil-well-pump inspector, to the post of California sales manager, to which he was appointed in 1950.

In his new position Goertz will be assisted by J. R. Walker, sales manager, petroleum equipment division; J. L. Axelson, sales manager, engine lathes division; L. G. Martial, sales manager, aircraft components division; and G. Painter, sales manager, foundry division.

Alten Purchases Ideco Pumping Unit Line

Alten Foundry & Machine Works has announced the purchase of the Ideco pumping-unit line from Dresser Industries. The Lancaster, Ohio, firm will continue the manufacture of Ideco-type pumping units and provide spare parts and service for those Ideco units already in the field.

Alten, by combining its present models with those heretofore built by Ideco, now offers operators a complete line of pumping units including all A.P.I. sizes. Alten units and Alten Ideco-type units are available through supply stores.

Lee C. Moore Makes Chance Shreveport Sales Engineer

Glenn G. Chance formerly of the engineering department of Lee C. Moore Corp. in Tulsa, is now sales engineer for the company, and will be located in Shreveport. Chance was educated in Tulsa and served in the United States Marines during the war.

Fort Worth National Adds To Capital Accounts

Stockholders of the Fort Worth National Bank approved a $2,000,000 increase in the bank's capital accounts through the sale of additional common stock at a recent special meeting, according to an announcement made by Estil Vance, president.

Under the plan submitted by director of the Fort Worth National and approved by the stockholders, the bank's capital and surplus accounts each will be increased from $6,000,000 to $7,000,000 to provide a total capital and surplus of $14,000,000. The bank's capital account, including undivided profits, would then be approximately $15,000,000. The proposed additional issue was recommended by the bank's board of directors on June 1, 1953, at their regular monthly meeting and is subject to final approval by the comptroller of currency.

National Supply Acquires Site for Gainesville Plant

A. E. Walker, president, The National Supply Co., has announced that the company has arranged to acquire an 80-acre plant site in Gainesville, Tex.

Plans are under way to erect a plant having about 100,000 sq. ft. of space and employing about 300 people when in full operation. The cost will be in the neighborhood of 3½ million dollars.

Gainesville is well located to serve oil-producing centers of the Mid-Continent and Southwest. It is on the Santa Fe Railroad and a main highway from Fort Worth and Dallas to Oklahoma City.

The company plans to manufacture oil-field machinery and equipment in the new plant.

The fittings that revolutionized pipe welding . . .

In the year 1931 Taylor Forge gave industry its *first real line* of seamless, butt-welding pipe fittings. We say it was the first *real* line because it was the first to include not only long and short radius ells, but also full branch and reducing tees, concentric and eccentric reducers, stub ends, caps and welding neck flanges.

This was a fully planned development. Many years before Taylor Forge had foreseen the future of the butt-welding fitting . . . had realized that pipe welding could not go beyond its then crude stage until pipe users were given *all* the fittings necessary to make up complete piping systems.

So Taylor Forge went to work on this and after long research and development came out with the full line that became the inspiration of modern pipe welding.

Naturally the organization that started ahead has kept ahead . . . in design, in quality, in breadth of line. That is why so many men who have followed the development of the WeldELL line, refuse to consider any other kind of welding fittings.

T F

For up-to-the-minute facts, see your Taylor Forge distributor

TAYLOR FORGE

TAYLOR FORGE & PIPE WORKS, General Offices and Works: P.O. Box 485, Chicago 90, Ill.
Offices in all principal cities. Plants at: Carnegie, Pa.; Fontana, Calif.; Hamilton, Ont., Canada

DIGEST OF NEW EQUIPMENT

IT'S NEW — CHECK IT

TRADE LITERATURE

1 ROCKWELL LUBRICANTS FOR NORSTROM VALVES is a new, comprehensive, 12-page bulletin describing lubricants, lubricant fittings, and lubrication methods for Rockwell-built Nordstrom valves. Three major types of lubricant, Hypermatic, Nordcoseal, and Lubricant DC-234 are described. Their functions are listed in detail. A selection chart is also offered showing which lubricants are recommended for use with a variety of fluids. The bulletin also illustrates and briefly describes bulk and gun-tube lubricants along with stick lubricants, bulk lubricant cans, and Hypreseal stem packing for use in the packing injector fittings of Nordstrom Hypreseal valves. *Rockwell Manufacturing Co.*

2 GRAVITY INSTRUMENTS FOR SPECIFIC GRAVITY OF GASES. In a new Bulletin 101-R2 featuring ARCCO's complete line of gas gravitometer instruments, the new recording gas gravitometer is featured. This instrument may be used for either recording-transmitting or for recording-controlling. The bulletin outlines in complete detail the principal of operation as well as listing all pertinent information helpful to engineers and purchasing agents. *American Recording Chart Co.*

3 SITE PREPARATION, a four-page, two-color folder illustrates the use of diesel tractors, engines, motor graders, and earth-moving equipment in the leveling of drilling sites, digging of slush pits, cutting access roads, and brush clearing. *Caterpillar Tractor Co.*

4 SCHLUMBERGER SERVICES. A 44-page catalog describes the complete line of oil-field services offered to solve technical problems confronting the petroleum industry. Services include electric, induction, gamma-ray, neutron, and section gage logging; Laterologging, Micrologging, Microlaterologging; photoclinometer, and dipmeter surveying; sidewall sampling; precision-gun, super-gun, shaped-charge, expendable-shaped-charge perforating; correlation logging; casing-collar location, wildcat and offshore service; temperature and geophone surveys; Baker bridge plug; depth determination; radioactive marker; and Baker production packer. *Schlumberger Well Surveying Corp.*

5 MEET WESTERN PIPING SUPPLY. This brochure introduces the facilities of a large pipe-fabricating company, a division of The Lummus Co., and discusses the importance of piping in nearly all industries. The booklet gives the reader a step-by-step tour through the plant progressing through each operation. *The Lummus Co.*

6 NEW PRODUCTION TOOL. Microscopic analysis of water samples to determine the source of water produced with oil is discussed in this new brochure. The method, Aquatrace, is based on the fact that water erodes and carries with it particles of whatever surface it moves over. Method will determine whether water is formational or is coming from behind pipe. *Aquatrace Service.*

7 DOUBLE-DISPLACEMENT ROD PUMP. Schematic illustrations and text describe the design and operating features of a rod pump for large-volume wells. The pump claims all of the production advantages of a full-volume tubing pump plus the operating advantages of an insert pump run on rods. Tables of comparative field tests and

FOR MORE INFORMATION . . . . use one of these cards

Postage Will Be Paid by Addressee

No Postage Stamp Necessary if Mailed in United States

BUSINESS REPLY CARD
Permit No. 3A, 34.9 P. L. & R., Tulsa, Oklahoma

THE OIL AND GAS JOURNAL
BOX 1260
TULSA, OKLAHOMA

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
41 42 43 44 45 46 47 48 49 50

For further information—without obligation—I have checked numbered circles above

Corresponding to new equipment items or trade literature abstracts in the Oil and Gas Equipment Digest of The Oil and Gas Journal, July 13, 1953

PLEASE PRINT
COMPANY NAME .....
STREET ADDRESS .....
CITY ..... ZONE NO. ..... STATE .....
NAME ..... TITLE .....

volumetric displacement are included. *Harbison-Fischer Manufacturing Co.*

8 MECHANICAL STIRRUPS. Brochure includes illustrations, features, and standard equipment tables of electric and air-powered stirrups with swing stages; and of stirrups with baskets. A full line of accessories is also covered. *Albina Engine & Machine Works.*

9 REX SPEED PRIMER PUMPS. Bulletin 53-37 is an informative catalog on self-priming centrifugal pumps. Centrifugal oil-field pumps range in capacity from 4,000 to 90,000 gal. per hour. Pumps are available in electric or gasoline-powered units or without power arranged for belt drive. Bulletin includes specifications, applications, construction details, and operation features. *Rex Chain Belt Co.*

10 SEAGOING COMPRESSOR STATIONS is a bound article by Donald M. Taylor, describing the problems involved and solutions in construction of a compressor station to handle flare gas from fields in the marshes and bays near the mouth of the Mississippi River. *Clark Bros Co.*

11 NEW 9% NICKEL STEEL TUBING — PROPERTIES AND PROCESSING. This 10-page bulletin, document with charts, tables and photographs, describes mechanical and working characteristics, heat treating behavior and weldability. It presents data showing tubing suitable for low temperature (—320° F.) service, and also for oil industry where chloride salts, hydrogen sulfide, carbonic acid and certain organic acids are encountered. *International Nickel.*

12 NEW NEMA FRAME DIMENSIONS, for A-C Motors, 1-30 hp., is a seven-page bulletin, containing data on new NEMA motor standards and compares old with new frame assignments for open-type polyphase, single-phase, and wound-rotor motors as well as totally-enclosed fan-cooled types. Also listed are suggested new frame assignments for foot-mounted and flange-mounted motors, and standards for minimum locked-rotor torque for general purpose single-phase motors. *General Electric Co.*

13 VERTICAL TURBINE PUMPS as an answer to many of industry's pumping problems are discussed in Bulletin W-450-B39. Liberal use of photographs throughout illustrates various vertical turbine pump applications in many industries. *Worthington Corp.*

14 TYPE B PRESSURE PACK WELL HEAD EQUIPMENT is presented in a new 16-page bulletin, which explains pressure pack principle of self-activating positive sealing, and includes descriptions and illustrations of the several component, interchangeable parts. *The National Supply Co.*

15 LEVEL GAGE SECTION CATALOG. This new section, which comprises over 60 pages, includes a full description of Klinger level gages for the oil industry, such as the type "U" and type "K" reflex gages, the type "J" and type "JA" double plate gages, level gages for liquefied gases, and high-pressure reflex level indicators for working pressures up to 6,000 psi. Steam-heated level gages, nonfrosting level gages, and intersurface level gages; perspex flameproof illuminators and other specialties for the oil industry are also referred to. *Richard Klinger, Ltd.*

16 GAS-OIL-RATIO COMPUTATIONS. Detailed procedure for conducting gas-oil-ratio tests of well production is covered in a new six-page application engineering data sheet. By means of a sample problem, the publication outlines the step-by-step flow calculations, based on pressure measurements from a portable recording instrument. *The Foxboro Co.*

18 FOUR-CYCLE SUPAIRTHERMAL V-TYPE STATIONARY. Nordberg 13-in.-bore and 16½-in.-stroke Supairthermal V-type engines as described in Bulletin 197 are built to meet the increasing demand for a high-power, heavy-duty diesel, duafuel, or spark-fired gas engine of moderate weight and small dimensions. Specifications present the weight and ratings of both the 12 and 16-cylinder engines which cover a horsepower range from 2,000 to 4,260 at 450 to 600 r.p.m. *Nordberg Manufacturing Co.*

FOR MORE INFORMATION . . . . use one of these cards

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
										41	42	43	44	45	46	47	48	49	50

For further information—without obligation—I have checked numbered circles above

Corresponding to new equipment items or trade literature abstracts in the Oil and Gas Equipment Digest of The Oil and Gas Journal, July 13, 1953

PLEASE PRINT

COMPANY NAME .....

STREET ADDRESS .....

CITY ..... **ZONE NO.** ..... **STATE** .....

NAME ..... **TITLE** .....

Postage Will Be Paid by Addressee

No Postage Stamp Necessary if Mailed in United States

BUSINESS REPLY CARD

Permit No. 3A, 34.9 P. L. & R., Tulsa, Oklahoma

THE OIL AND GAS JOURNAL
BOX 1260
TULSA, OKLAHOMA

DIGEST OF NEW EQUIPMENT

IT'S NEW ✓ CHECK IT

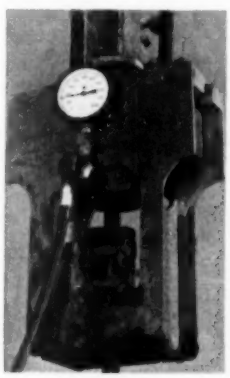
by Dan B. Miller

19 NEW INTERLOCKING BEAM-TYPE PIPE RACKS AND WALKWAYS. The pipe racks and walk units consist of heavy beams on welded pyramid-type posts. The ends of the beams are fitted with heavy angle clips which fit into slots provided on the posts. No field bolts are required thus providing maximum speed in assembly. Each pipe-rack section (three beams) is 16 ft. long by 24 ft. wide and has a capacity of 100,000 lb. These pipe racks and walks are furnished in either 2-ft., 2-ft. 9-in., or 3-ft. 6-in. heights and the walkways with end stair can be had in either 48 or 60-ft. lengths. *Lee C. Moore Corp.*

IT'S NEW ✓ CHECK IT

20 SB 30 PIPELINER SPECIAL. Equipped with adjustable boom arms the SB 30 is furnished with two, three, or four drills, in either the heavy-duty 4-in. class or the lighter 3-in. class, for mounting on any suitable crawler tractor. For extra air Le Roi will equip the tractor with the 600-cu.-ft. per minute compressor mounted on the rear and driven through the power takeoff. The new SB 30 Pipeliner Special can be quickly mounted or dismounted leaving the tractor free for other work and can be equipped for drilling from two to four holes at once. Control of the chassis movement is entirely mechanical and is actuated by air motors. The drilling unit will move from the closed position of 6 ft. outward from the tractor to a maximum open position of 10 ft. Vertical positioning of the drills is also motor controlled. The drill can be angled outward to almost 45° and inward toward the tractor to almost 30°. *Le Roi Co.*

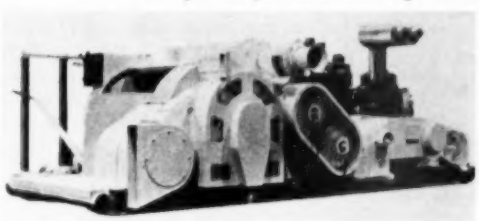
IT'S NEW ✓ CHECK IT



21 DYNASCOPE SAFETY CARRIER AND PUMPING CONTROL incorporates a polished-rod carrier for universal application to all rod-type pumping wells. Hydraulically operated accessories are employed for safety servicing when maneuvering or adjusting rods or spacing or bumping valves. Simultaneously or when pumping, the polished-rod load is automatically weighed and recorded. Controlled micro-settings in spacing may be made, tested, changed, or compared progressively with the well in continuous operation at constant or various pumping speeds, and under the constant guidance of the load indicator or recorder. The load indicator or recorder affords an immediate and practical check of well conditions. The load recorder affords a daily record in many other phases of well operation and will identify if typical conditions prevailed such as at a time when dynamometer cards might be taken. It is unnecessary to shut down the pumping well preparatory to or during these operations, thereby assuring settled pumping conditions and true settings of rod adjustment as well as true readings of well loads. *The Dynascope Co.*

IT'S NEW ✓ CHECK IT

22 BREWSTER N-45. The heavy-duty, fully portable N-45 is a 350-hp., torque-converter rig for 6,500-



KEEP INFORMED ✓SAVE TIME ✓TEAR OUT CARD ✓CHECK IT ✓MAIL IT

This Digest of New Equipment offers you a quick resume of important features of new or improved products and trade literature and the opportunity to obtain complete information on each subject by use of the convenient "CHECK IT - MAIL IT" service card.

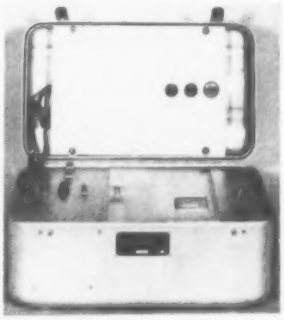
ft. drilling. Patterned after proved design, the compact N-45 meets the need for a flexible rig suitable for medium drilling depths or deep-well workovers. The versatile unit can mount any make or model motor up to 350 hp., using any fuel. It has a drum core measuring 18 in. in diameter by 40 in. in length; 8 by 42-in. water cooled, forged-steel brake rims and equalized full-wrap brakes; a 6-in. drum shaft of heat-treated alloy; and a Fawick clutch and auxiliary positive clutch on the drum. The new rig has two forward and a reverse drum and rotary drive speeds. Input horsepower of 300 develops from 3,590 to 13,750 lb. of line pull at 1,912 to 481-ft. per minute line speed with transmission in high speed; from 9,950 to 38,000-lb. line pull at 687 to 193-ft. per minute line speed with transmission in low speed. All clutches are air operated and all controls are conveniently located at the driller's position in a central control panel. *The Brewster Co., Inc.*

IT'S NEW CHECK IT

23 SLIDE VALVE MANDRELS FOR GAS-LIFT VALVES. Two new types of mandrels for gas-lift valves permit the communication port between the tubing and the gas-lift valves to be opened or closed by wire-line tools. The mandrels contain an internal slide valve, fitted with O-ring sealing members, that may be moved to open position whenever it is necessary to gas lift the well, and moved to closed position when gas lift is not required. When the slide valve is in closed position, the gas-lift valve is completely isolated from flow and pressure within the tubing. The slide valves are the same inside diameter as the tubing string, so that bottom-hole pressure bombs and other instruments may be run through them. The Type D-2 mandrel is designed for use with one gas-lift valve as illustrated. Since the gas-lift valve can be blocked off completely from the tubing string, this mandrel permits gas-lift valves to be installed upon the original completion of the well and all normal completion practices, including cementing, circulating, squeezing, and acidizing, to be carried on without damage to the gas-lift equipment. While natural flow exists, the gas-lift valves remain blocked off, fully protected against cutting, plugging, and other hazards. When gas lift is necessary, a wire-line shifting tool is run to open the slide valves, thus placing the gas-lift valves in operating position, without the necessity of pulling tubing. After the well is loaded, all gas-lift valves above static fluid level may be blocked off if desired, to be opened only when it is necessary to load the well with fluid at some future date. The tubing string is suspended on an inner sleeve. The lug end of the mandrel is a one-piece casting. The valve guard is welded to the outer sleeve that is never under tension. *Garrett Oil Tools, Inc.*

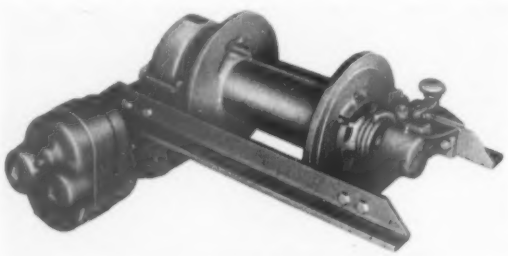
IT'S NEW CHECK IT

24 A NEW ACOUSTICAL WELL SOUNDER-FLUID LEVEL RECORDER. In two parts, a well-head attachment and an amplifier-recorder unit, the combined units weigh 55 lb. Except where unusual conditions are anticipated, all dials on the amplifier - recorder are preset and factory sealed, so that no technical experience is necessary to operate it. The amplifier-recorder is enclosed in a waterproof aluminum case, which can be made submersion-proof on order. Operated from a 6-volt automobile battery, it is of plug-in construction for ease of repair. Total weight of the unit is 30 lb. The 6,000-psi.-test well-head attachment weights 25 lb. Its firing mechanism may be dissembled by hand for easy cleaning. In operation the recorder makes routine single-trace recordings at 9,000 ft. The records, which clearly indicate the first collar, all tool joints, and the fluid level, are just as clear at 9,000 ft. as they are at 1,000 ft. *Associated Equipment, Inc.*



IT'S NEW CHECK IT

25 HYDRAULIC POWERED WINCH. Utilizing Vickers hydraulic motors, winches up to 15,000-lb. capacity are now available. The hydraulic-powered winch was designed to eliminate two basic problems encountered with standard-powered winches. First, the need for extremely close control of raising and lowering the load for precise

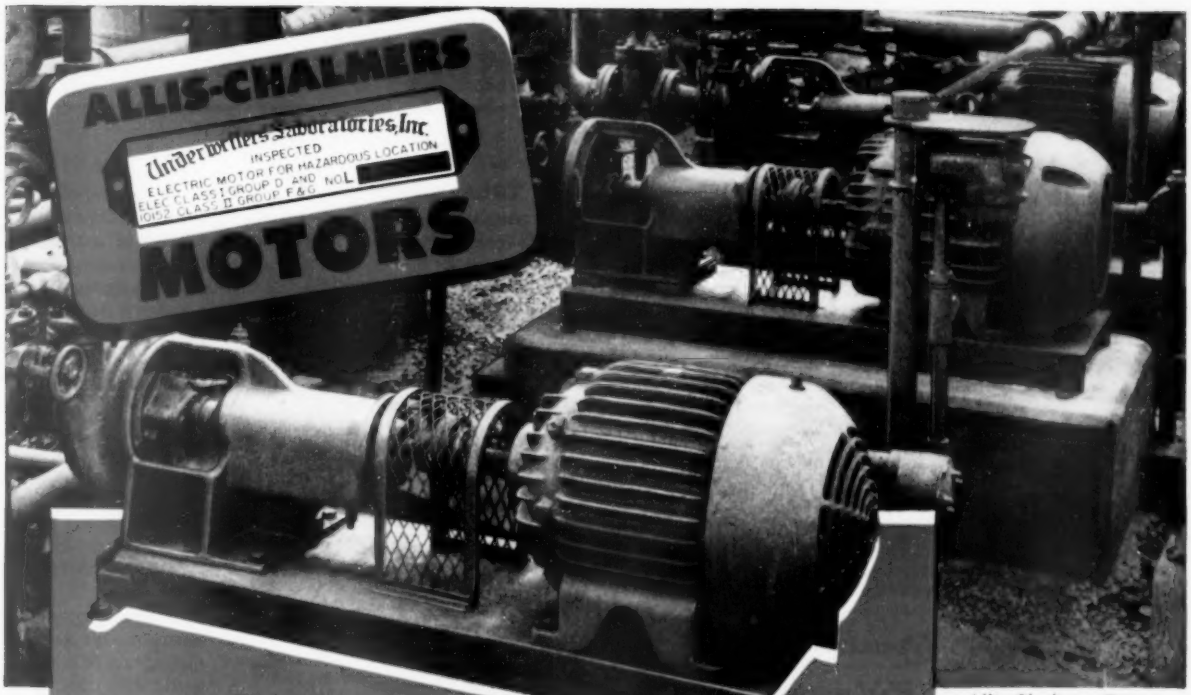


equipment installation and similar work and, second, the need for a winch in places inaccessible to or distant from the source of power. These winches are available with direct or chain drive. *Tulsa Winch, Division of Vickers, Inc.*

IT'S NEW CHECK IT

26 NEWLY DESIGNED SWING JOINTS include and feature Timken tapered roller bearings to promote greater ease in handling and to reduce friction. This development introduces a swing joint capable of extreme load capacities. Model 857 is packed with an O-ring seal and, with the simple aid of a screw driver, may be repacked without adjustments or dismantling any part of the joint. The surface upon which the O-ring operates is heavily chrome plated. Alemite fittings are included for periodic lubrication. Available in 3 and 4-in. iron-pipe sizes, the inlet end is flanged and the outlet end is provided with female pipe thread. *Oil Equipment Manufacturing Company, Inc.*

IT'S NEW CHECK IT



Refinery Men Like This Motor—

Allis-Chalmers Type APZZ explosion-proof motors driving Allis-Chalmers oil-lubricated frame-type pumps in eastern oil refinery. Ratings from ½ hp to 100 hp at 3600 rpm.

Here are 3 Good Reasons Why

1 Cast Iron Construction

Frame, end housings and conduit box are cast iron — resist corrosion. Fan is of non-sparking, corrosion-resistant material. Operates indoors or outdoors without added protection.

2 Wide Open Air Flow

No enclosed external air passages to clog. Easy to clean with cloth, brush, air hose or vacuum. Simply remove fan cover and whole radiating surface is exposed for inspection and cleaning.

3 Shielded Bearings

Ball bearings are double-shielded type, pre-lubricated at the factory. Additional lubricant will normally not be required for long periods. However, provision is made for in-service lubrication, when desired.

GET complete information on why Allis-Chalmers motors are preferred for indoor and outdoor refinery service. Remember, too, that Allis-Chalmers can supply complete drive units, including motor, control and *Texrope* V-belt drive—or complete pumping units. Call your nearby Allis-Chalmers District Office, or write for Bulletins 51B7286 and 51B7149. Allis-Chalmers, Milwaukee 1, Wisconsin.

A-4050

Texrope and *Vari-Pitch* are Allis-Chalmers trademarks.

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Distributors, Certified Service Shops and Sales Offices throughout the country.

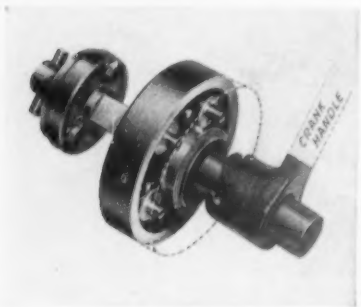
CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE V-belts in all sizes and sections, standard and *Vari-Pitch* sheaves, speed changers.

PUMPS — Integral types from ¾ in. to 72 in. discharge and up.

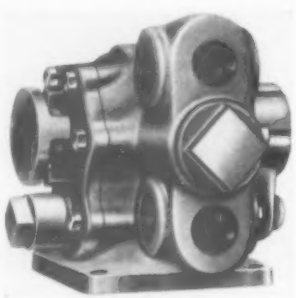
ALLIS-CHALMERS

27 THE SAFETY CRANK can turn only in one direction. If the engine kicks back, four cams jam against the shaft hub so the crank cannot spin counterclockwise. The shock of the kickback is absorbed by the crank's friction clutch, preventing damage to the engine. Safety crank fits any engine that is started by crank or rope pulley, or has a place to put one. A bracket adapter and rope or pulley are supplied to fit any type of engine. *Safety Crank Co.*



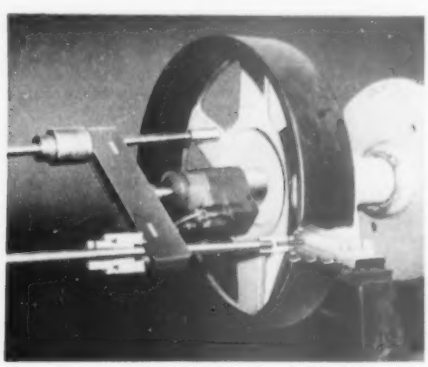
IT'S NEW CHECK IT

28 TYPE 555-RO FOUR-WAY HYDRAULIC VALVE provides a simple, inexpensive, and reliable self-contained mechanism to position double-acting hydraulic cylinders, or hydraulic motors. Its applications are on hydraulic lifts, bulldozers, road machinery, drilling equipment, earth-moving machinery or other power equipment. This valve may be used to operate one, two, or three hydraulic cylinders. In road-scraper work the blade can be firmly held in any position or allowed to float up or down to follow contour of ground if drawn backwards. Design pressure is 300 to 1,500 psi. Check and relief valves and seats are of special hardened stainless-steel alloy. Net weight is 35 lb. *A. W. Cash Co.*



IT'S NEW CHECK IT

29 HEAVY-DUTY HUB PULLER. This new set is designed for pulling hubs and any type of sprocket on drilling-rig draw works. It can be used with any type of jack, hydraulic or otherwise. The adapters are made for holes from ½ to 1 in. and are constructed of 4140 H.T. *Baird Manufacturing Co.*



IT'S NEW CHECK IT

30 TREATER VALVE. This rugged valve, designed for rough oil-field use, was designed specifically for trouble-free operation on the oil or water leg of a treater. Design is simple for easy maintenance. It has been operationally pressure rated at 60-lb. w.p. Its buna-N single seat insures tight shutoff. The Teflon seal in its rotary stuffing box prevents leakage. The valve, with lift lever for manual dumping, is unaffected by upstream or downstream pressure changes. It is furnished complete with drip pot for equalizing gas connections. It is available in 2-in. screwed angle, and 3 and 4-in. flanged angle-type bodies. *Kimray, Inc.*

IT'S NEW CHECK IT

31 NEW TEFLON IMPREGNATED BRAIDED PACKING has given as much as 10 to 30 times the length of service obtained with conventional mechanical packings. Teflon, because of its chemical and electrical properties and its complete inertness to practically every known chemical, has already been widely used in the chemical and electronic fields. Teflon's toughness, antihesiveness, and low coefficient of friction, and its freedom from necessity of using lubricants, either wet or dry, combined with the great strength and heat resistance of braiding fiber offers a packing well suited to petroleum industry needs. *Abbott & Biddle.*

IT'S NEW CHECK IT

32 IMPROVED LINE OF BURRLESS BULLET PERFORATORS. These improved perforators, designated M-3 are a vast improvement over the bullet-type perforators that were in service a year ago. Improved high-temperature powder, improved density of the powder, and improved bullet penetrating properties are among the many changes made. These changes have resulted in an increase of 25 per cent in penetration over former bullet-type perforating equipment. This performance has been substantiated by an exhaustive series of surface penetration tests with all sizes of M-3 perforators. *McCullough Tool Co.*

Pipe-Line Construction

PIPE-LINE activity as reported below by The Oil and Gas Journal is compiled from information received from pipe-line companies and contracting firms.

These projects include those planned, proposed, under way, and contracted. Uncontracted projects are indicated by a • preceding the company name.

Crude-Oil Pipe Lines

• **California - Oregon Pipe Line System**—103 miles, 6-in., proposed, Crescent City, Calif., to Medford, Oregon.

• **R. A. Goodall.**—45 miles, 6-in., planned, Little Beaver to Merino, Colo. (To connect with Sterling system).

• **Gulf Refining Co.**—55 miles, 12-in., planned, Bay Marchand to Plaquemines, La.

Humble Pipe Line Co.—71 miles, 16-18-in., under way, East Texas to Louisiana-Texas border. (30 miles of 16-in., and 41 miles of 18-in.) O. R. Burden Const. Co. Completion date 10-53.

Under way Longview to Louisiana border.

• **Interstate Oil Pipe Line Co.**—116 miles, 22-in., planned, Shreveport to Baton Rouge, La.

Interstate Oil Pipe Line Co.—55 miles, 16-in., under way, Raceland to Anchorage, La. L. E. Farley.

Plaquemine to Anchorage, La.

Lakehead Pipe Line Co.—635 miles, 30-in., under way, Superior, Wis., to Sarnia, Ontario, Canada.

Contracted, Superior to Wisconsin-Michigan state line. Mahoney Contr.

Mackinac City along Straits of Mackinac to Red Oak, Mich. Bechtel Corp.

Red Oak via Bay City to International Boundary south of Port Huron on St. Clair River. Conyes Const.

Water crossings of Mackinac, Saginaw, and St. Clair rivers. Merritt - Chapman & Scott Corp., W. J. Meagher & Sons, Inc., and Midwestern Constructors.

Under way, Michigan-Wisconsin State line through Crystal Falls to Cooks, Mich. Anderson Bros. 9-15-53.

Under way, Cooks to St. Ignace, Mich., on Straits of Mackinac. Midwestern Constructors, Inc.

• **Magnolia Pipe Line Co.**—29 miles, 8-in., planned, Midland County, Texas area.

• **Pasotex Pipe Line Co.**—146 miles, 10-in., planned, Snyder to Wink, Tex.

Phillips Pipe Line Co.—26 miles, 8-in., under way, northeast area of Andrews County, Texas.

18 miles, under way, gathering lines, northeast area of Andrews County, Texas.

• **Progress Pacific Pipeline Co.** — 1,100 miles, 24-in., planned, Odessa, Tex., to Los Angeles Harbor, Calif.

• **Roosevelt Oil & Refining Corp.** — 22 miles, 4 and 6-in., planned St. Helens to Norwich, Mich.

Service Pipe Line Co.—153 miles, 12-16-in., under way, Tioga-Beaver Lodge area to Mandan, N. D. O. R. Burden Const. Corp.

55 miles, 4-6-8-in., under way, Tioga-Beaver Lodge area gathering system. C. P. Bartley & Son.

Texas Pipe Line Co.—34 miles, 6-in., under way, Sour Lake to Port Arthur, Tex. Houston Contracting.

45 miles, 8-10-in., under way, between Erath and Bayou Sale stations. Houston Contracting Co.

• **West Coast Pipeline Co.**—960 miles, 20-22-in., planned, Wink, Tex., to Norwalk, Calif.

Products Pipe Lines

• **H. W. Bass & Sons, Inc.**—152 miles, 4-6-in., proposed, Duval and Live Oak counties, Texas, to Corpus Christi, Tex.

Buckeye Pipe Line Co.—370 miles, 10-14-16-in., under way, Linden, N. J., via Allentown, Pa., to Auburn, Syracuse, Waterloo, and Rochester, N. Y. 9-53.

Guthsville to Dupont, Pa. Pipe Line Const. & Drilling Co.

Dupont north to Pennsylvania-New York state line. Fulghum Contr. Corp.

Pennsylvania-New York state line to Auburn, N. Y. Williams-Austin.

Auburn to Syracuse, N. Y. Williams-Austin.

Auburn to Caledonia, N. Y. Universal Map and Survey Co.

• **Continental Pipe Line Co.**—(Yellowstone Line)—600 miles, 8-in., planned, Billings, Mont., to Spokane, Wash. (Joint ownership of Sinclair Pipe Line Co., Gulf Refining Co., and Texas Pipe Line Co.)

Harbor Products Systems—36 miles, 16-in., under way. Woodbury Junction, Philadelphia to Trembley Point, N. J. Construction Service Co. and H. C. Price Co. (Joint ownership of Sinclair Pipe Line Co., Gulf Refining Co., and Texas Pipe Line Co.)

Indiana Farm Bureau Cooperative Association, Inc.—180 miles, 8-in., under way, Mt. Vernon to Indianapolis, Ind. R. B. Potashnick, contractor. 8-15-53.

52 miles, 4-in., under way, Indianapolis to Peru, Ind. R. B. Potashnick, contractor.

• **Inland Empire Pipe Line Co.**—504 miles 10-in., proposed, Billings, Mont., to Spokane, Wash.

• **Kaneb Pipe Line Co.**—236 miles, 8-in., planned, Wichita and Potwin, Kans., to Fairmont, Neb. 9-53.

• **Phillips Petroleum Co.**—54 miles, 6-in., planned, Goldsmith to Borger, Tex.

52 miles, 10-in., planned, Shell's Brookshire system to Sweeny, Tex.

Plantation Pipe Line Co.—82 miles, 14-in., under way. Charlotte to Greensboro, N. C. Anderson Bros.

Salt Lake Pipe Line Co.—140 miles, 8-in., under way, Pasco to Spokane, Wash. Lyles & Young Co. Completion date 10-1-53.

• **Standard Oil Co. (Ind.)**—Planned, Mandan, N. D., to Moorhead, Minn.

Standard Oil Co. (Ind.)—243 miles, 10-12-in., under way, Whiting, Ind., to River Rouge, Mich.

Porter, Ind., to Colon, Mich. Somerville Const. 9-1-53.

• **Sunray Oil Corp.** — 440 miles, 10-in., planned, Duncan, Okla., to Mississippi River.

Sun Pipe Line Co.—50 miles, 8-in., under way, Toledo, Ohio to Inkster Junction west of Detroit. 10-53. R. L. Coolsaet Const. Co. and Poston Pipe Line Co.

• **United States Pipe Line Co.**—1,799 miles, 22-26-in., proposed, Beaumont, Tex., to Newark, N. J.

Beaumont, Tex., to Memphis, Tenn.

Memphis, Tenn., to Louisville, Ky.

Louisville, Ky., to Newark, N. J.

Laterals to Paducah and Lexington, Ky.

• **Williston Basin Pipe Line Co.** — 244 miles, 8-in., proposed, Laurel-Billings, Mont., refineries to Glendive, Mont.

Wolverine Pipe Line System—200 miles, 14-in., under way, Chicago to Toledo and Detroit. (Joint ownership of Shell, Texas, and Cities Service). Completion date 1-54.

Kalamazoo River westward to Kennedy pump station at East Chicago, Ind. Midwestern Constr., Inc.

Natural-Gas Pipe Lines

• **Arkansas - Missouri Power Co.** — 140 miles, 2 to 10-in., planned, St. Francis River, Clay County, Arkansas, to near Campbell, Mo.

• **Associated Natural Gas Co.**—88 miles, Missouri.

• **Atlantic Seaboard Corp.**—29 miles, 26-in., proposed, looping along Cobb-Rockville line.

• **Carolina Natural Gas Corp.**—185 miles, 2-12-in., proposed, lateral lines off Transcontinental in North and South Carolina.

• **Chattahoochee Natural Gas Co.** — 70 miles, proposed, Floyd County, Georgia, to Dalton, Ga.

• **Chicago District Pipe Line Co.**—35 miles, 24-30-in., proposed, Chicago area.

• **Cities Service Gas Co.**—18 miles, 16-in., Lawrence and Newton counties, Missouri.

69 miles, 20-16-in., proposed, Cleveland, McClain, and Garvin counties, Oklahoma.

• **Coast Counties Gas & Electric Co.**—40 miles, 3, 4, and 8-in., planned. Coast and Valley region, California.

• **Colorado Interstate Gas Co.**—365 miles, 22-in., proposed, Green River, Wyo., to Denver, Colo. 1954.

116 miles, proposed, Colorado, Oklahoma, Texas, and Kansas. 1953.

• **Cumberland and Allegheny Gas Co.**—31 miles, 12-in., proposed, Garrett County, Md., to Keyser, W. Va.

East Tennessee Natural Gas Co.—158 miles, 16-in., under way. Knoxville to Kingsport, Tenn. (58 miles of laterals.) 11-53.

• **El Paso Natural Gas Co.**—1,778 miles, proposed, Permian basin, New Mexico, Texas and Colorado.

• **Fort Worth Basin Gas Co.**—Planned, Novice, through Brown and Comanche counties, Texas.

• **Glacier Gas Co.**—285 miles, 20-in., proposed, Kalispell, Mont., to Spokane, Wash.

120 miles, 16-in., proposed, Spokane to Hanford, Wash.

91 miles, 8⅝-in., proposed, Spokane to Lewiston, Idaho.

130 miles, 12¾-in., proposed, Spokane to International boundary at Trail, British Columbia.

Gulf Interstate Gas Co.—860 miles, 30-in., under way. Acadia Parish, La., to Boyd County, Ky. H. C. Price and Houston Contracting. 11-54.

Rayne, La. to Kincade, Tenn. Houston Contr.

Under way (north section) Kincade, Tenn., to Kenova, W. Va. H. C. Price.

(Southern section) Lake Charles, La., to Kincade, Tenn. Houston Constr.

230 miles, gathering lines, contracted, Associated Pipe Line Contractors, Anderson Bros., Williams Bros.

329 miles, 12 to 24-in., proposed. Laterals off Acadia Parish, Louisiana, to Boyd County, Kentucky, line.

• **Home Gas Co.**—32 miles, 12-in., planned, Breesport to Union Center, N. Y.

17 miles, 12-in., proposed, loops from Hansock to Sanford, N. M.

Home Gas Co.—46 miles, 12-in., under way, Tioga and Broome counties, New York. H. L. Gentry Const.

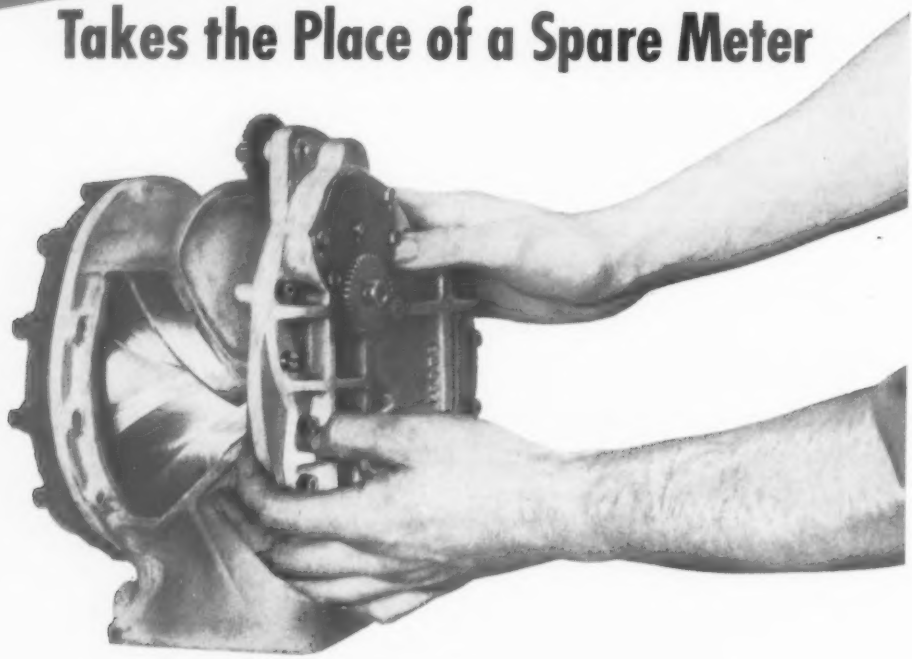
22 miles, 12-16-in., under way, Binghampton, N. Y.

• **Interstate Power Co.**—26 miles, 8-in., proposed, from Nat. Gas P. L. Co. America line near Hooppole, Ill., to Clinton, Ia.

Iowa-Illinois Gas & Electric Co.—41 miles, 10-in., start last half '53, Washington County to Cedar Rapids, Iowa.

Kansas-Nebraska Natural Gas Co., Inc.—54 miles, 4-6-in., under way, Neligh to Hartington, Neb. Brodie Constr. 9-53.

THIS *Replaceable* MEASURING UNIT
Takes the Place of a Spare Meter



—BRODIE *BiRotor* Readily Replaceable Measuring Unit

- BiRotor Measuring unit is completely interchangeable and readily replaceable.
- Eliminates need and extra cost of a spare meter.
- Permits quick change-over without disturbing existing lines or connections.
- Other features include: *Welded all-steel meter housing; precision dry adjustment; positive displacement with true rotary operation; just two moving parts in measuring chamber.* When you're looking into meters, *it's what's inside that counts.* Standardize on Brodie BiRotor—the meter with the *replaceable measuring unit.*

Write for Pipe-Line Metering Bulletin No. 634

ALL-STEEL BiRotor TRUE-ROTARY

BRODIE METERS

RALPH N. BRODIE CO., INC. • ALVARADO & WEST 137th AVE., SAN LEANDRO, CALIFORNIA, U.S.A.

MT. VERNON, N.Y. 550 So. Columbus Ave. | CHICAGO 5, ILL. 59 E. Van Buren | DALLAS, TEXAS 167 Parkhouse St. | SEATTLE 9, WASH. 221 9th Ave. N. | LOS ANGELES 22, CALIF. 5401 E. Sheila Street

REPRESENTATIVES AND STOCKS IN ALL PRINCIPAL CITIES

42 miles, 4-6-in., under way, Neligh to O'Neil, Neb. Brodie Const. 9-53.

61 miles, 3-2-in., under way, lateral lines from Broomfield through various towns to Wausa, Neb. Brodie Const. Co. 9-53.

• **Lone Star Gas Co.—100 miles, proposed, storage fields to the Dallas-Fort Worth area.**

35 miles, 12-in., proposed, southeastern Schleicher County.

• **Manufacturers Gas Light & Heat Co.—** 40 miles, proposed, Allegheny, Washington, and Beaver counties, Pennsylvania.

213 miles, 3 to 26-in., proposed, various points on system in Pennsylvania, West Virginia, and Ohio.

• **Mississippi River Fuel Corp.—109 miles,** 10-18-in., planned, laterals in Woodlawn and Waskom gas fields, Texas.

Missouri Central Gas Co.—25 miles, 6-in., contracted, Moberly to Macon, Mo. L. R. Young Const. Co.

• **Missouri Public Service Co.—136 miles,** 8-10-in., proposed, New Franklin to Trenton, Mo.

24 miles, 10-in., Johnson County to Clinton, Mo.

• **Montana Power Co.—52 miles, 16-in.,** planned, Canada - Montana border to Cut Bank, Mont.

• **Morganfield Natural Gas Co.—31 miles,** 4-6-in., planned, through Sturgis, Providence, Clay, Diamond, Wheatcroft, and Sullivan, Ky.

• **Natural Gas Producers Inc.—100 miles,** 12-in., planned, Yenter pool to Denver, Colo.

• **Nevada Natural Gas Pipe Line Co.—** 114 miles, 12¾-in., proposed, Topock, Ariz., to Las Vegas, Nev.

• **New River Gas Co.—50 miles, planned,** Summers to Monroe counties, West Virginia, to Narrows and Dublin, W. Va.

• **New York State Electric and Gas Co.—** 59 miles, 8-10-24-in., proposed, Oneonta and Norwich to DeRuyter, N. Y.

Niagara Mohawk Power Corp.—55 miles, 10-in., under way. Watertown to Syracuse, New York. Williams-Austin Co. 8-1-53.

• **Northern Indiana Fuel & Light Co.—** 33 miles, 8-in., proposed, Edgerton to Auburn, Ind.

• **Northern Natural Gas Co.—**458 miles, proposed, Kansas, Texas, Oklahoma, and Nebraska, Iowa and Minnesota to connect with Permian Basin System.

475 miles, proposed branch lines to Iowa, Nebraska, Minnesota and South Dakota.

Northern Natural Gas Co.—Section No. 1, 92 miles, 30-in., under way, Dumas via Sunray to main line north of Canadian River, Texas, and two loops near Beaver station, Oklahoma, R. H. Fulton & Co.

Northern Natural Gas Co.—Section 2, 70 miles, 30-in., contracted, loops near Mullinville, Bushton and Clifton stations, Kans., and Palmyra station, Neb. Lone Star Constructors.

Northern Natural Gas Co.—Section 3, 94 miles, 24-in. and 30-in., contracted loops near Paulina, Ogden, and Oakland stations, Iowa, G. G. Griffis Construction Co.

• **Northwest Natural Gas Co.—750 miles,** planned, Washington, Oregon, and Idaho.

24-in., Eastport, Idaho, to Monroe, Wash.

18-in., Monroe to International boundary near Lynden, Wash.

22-in., Monroe to near Seattle, Wash.

20-in., Seattle to Portland, Ore.

• **Ohio Fuel Gas Co.—31 miles, 20-in.,** planned, Licking County to Richland County, Ohio.

22 miles, 16-in., planned, Dayton, Troy, Piqua, and Sidney, Ohio.

23 miles, 16-20-in., planned, Wellington to Elyria, Ohio; 16 miles, 20-in., planned, Benton Station to Crawford Station; 18 miles, 20-in., Crawford Station to near Columbus; 16 miles, 16-in., planned, Berlin to Sandusky, Ohio.

74 miles, 3 to 20-in., planned, Hocking, Knox, and Ashland counties, Ohio.

47 miles, 20-in., planned, Benton Township, Hocking County, to Columbus, Ohio.

61 miles, planned, northern and southwestern Ohio.

33 miles, 20-in., proposed, Jefferson to Seneca, Ohio.

• **Pacific Gas & Electric Co.—**50 miles, 12-16-20-in., planned, Fresno to Merced, Calif.

(Section 2) 20-in., Holm to Topock-Milpitas line.

(Section 3) 12-in., parallel existing Madera-Livingston line, planned. Napa Wye to Shellville; Cotati to Santa Rosa, Calif.

170 miles, 34-in., proposed, main-line loops along Topock, Ariz., to Milpitas, Calif.

Pacific Gas & Electric Co.—86 miles, 34-in., under way, parallel sections along Topock-Milpitas line. Engineers Pipe Line, Ltd. Summer 1953.

• **Pacific Northwest Pipeline Corp.—1,466** miles, proposed, Ignacio, Colo., to Bellingham, Wash.

380 miles, proposed, laterals and spurs off main line to Pocatello, Idaho, to Yakima, Wash.

Permian Basin Pipeline Co.—234 miles, 16-24-26-30-in., contracted, West Texas and New Mexico. R. H. Fulton & Co.

Public Service Co. of Colorado — 34 miles, under way, Douglas Creek and other gas fields to Grand Junction, Colo., area. Foutz & Buraum Const. Co. 9-1-53

• **Rockland Light & Power Co.—22 miles,** 8-in., proposed, Orangetown to Tompkins Cove, N. Y.

• **Shenandoah Gas Co.—**39 miles, 3-4-8-in., proposed, Middleton, Va., to Martinsburg, W. Va.

Pat. 1,234,567
Other Pat. Pend.

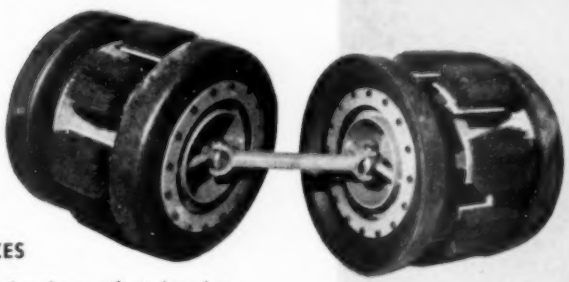
WEAR COMPENSATING

PIGS

Sizes 6" to 34"

. . . with years of proof that the rugged, simple design means SAFE OPERATION . . . even through pipe lines with sharp bends*

TYPE GP-3

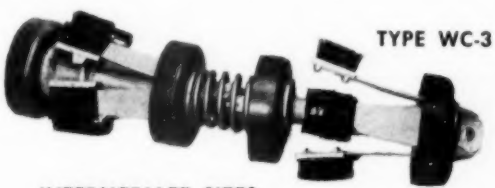


BIG-INCH SIZES

Improved "GP" design: large, stiff steel brushes each expanded by 200-lb. arched spring.

**These 2 jointed Pigs traverse welding ells. Other models traverse all pipeline gate valves.*

TYPE WC-3



"There is a Pig design for your pipe-line problem."

INTERMEDIATE SIZES

"Spring-board" steel arms expand brushes or chevron blades . . . will even clean 2 sizes of pipe when Pig equipped with special cups or discs.

Copyright 1953

T. D. Williamson, Inc.

THE PIG WITH THE POKE
CLEANS PIPE LINES

P. O. BOX 4038
TULSA 9, OKLAHOMA

REPRESENTATIVES . . . HOUSTON • PITTSBURGH • KENILWORTH, N. J. • AMARILLO
CASPER • PROVO, UTAH • LOS ANGELES • OAKLAND • EDMONTON • CALGARY
TORONTO • BUENOS AIRES • DURBAN, SOUTH AFRICA

"More than seven and a quarter million Savings Bonds . . . worth at maturity more than $236,444,000"

L. L. COLBERT
President, Chrysler Corporation

"A planned program of thrift is essential to personal, material security. The regular purchase of U.S. Savings Bonds can be a sound part of any savings program, along with investment in a home and proper insurance protection. Chrysler Corporation employees support the Payroll Savings Plan for the purchase of U.S. Savings Bonds. They have bought more than seven and a quarter million of the bonds, worth at maturity more than $236,444,000. Such systematic thrift not only benefits them, but strengthens the economy of their country."

Largely as a result of consistent thrift by Payroll Savers, Americans today hold a cash value of more than $49 billion in Defense Bonds. This figure is $7.5 billion greater than at the end of the war.

Every month, 7,500,000 employees of more than 43,000 companies buy $150 million more in Defense Bonds.

Think of the reservoir of future purchasing power represented in the more than $49 billion that men and women have put aside for the proverbial rainy day.

Consider still another benefit to industry. The Payroll Saver is a serious worker. Records of many companies prove that lost-time accidents decrease, absenteeism is reduced and production improves as enrollment in the Payroll Plan goes up.

If your company does not have the Payroll Savings Plan . . . or if you have the Plan and employee participation is less than 50% . . . call the attention of your President or Chief Executive to

Two Easy Steps to a Successful Payroll Savings Plan

1. Phone, wire or write to Savings Bond Division, U.S. Treasury Department, Suite 700, Washington Building, Washington, D.C.
2. Your State Director, Savings Bond Division, will tell you how to conduct a simple, person-to-person canvass that will put a Payroll Application Blank in the hands of every employee.

That is all management has to do. Your employees will do the rest. They, like thou-ands of Chrysler employees, want to provide for their personal security.

The U. S. Government does not pay for this advertising. The Treasury Department thanks, for their patriotic donation, the Advertising Council and

THE OIL AND GAS JOURNAL
TULSA 1, OKLAHOMA

• **South Carolina Natural Gas Co.**—160 miles, 16-12-10-in., proposed, Aiken, S. C., to cities of Columbia, Summerville, and Charleston, S. C.

• **South Georgia Natural Gas Co.**—339 miles, 2-12-in., planned, Phoenix, Ala., to Tallahassee, Fla. (a) 12-in., Phoenix, Ala., to Albany, Ga., (b) 10-in., Albany, Ga., to Moultrie, Ga., (c) 8-in., Moultrie, Ga., to Tallahassee.

• **Southern California Gas Co., and Southern Counties Gas Co.**—73 miles, 30-in., planned, loops on main line from Blythe to Los Angeles.

Southern Natural Gas Co.—1,235 miles, 24 to 4½-in., under way, Louisiana, Mississippi, Alabama, and Georgia, and South Carolina. Houston Contracting and H. C. Price. Fall 1953.

Gwinville, Miss. to Lake Pontchartrain, La. Houston Contr. 8-53.

Bass Junction, Ga., to South of Wrens, Ga. Houston Contr.

• **Southwest Gas Corp., Ltd.**—26 miles, proposed, from P.G.& E. line to Victorville, Calif.

• **Tennessee Gas Transmission Co.**—574 miles, 30-in., proposed, Kinder, La., northeast through Louisiana, Mississippi, to Portland, Tenn.

130 miles, proposed, looping in Texas and Louisiana. Including 67 miles of 30-in. line.

63 miles, 26-in., proposed, loop near Greenup, Ky., and Mercer, Pa.

45 miles, 20-in., proposed, Buffalo, N. Y., to the U. S.-Canadian border Hamburg station near St. Catherines.

Tennessee Gas Transmission Co.—Under way, 20 miles, 30-in., Natchitoches, La., to Goldonna, La. Oklahoma Contracting Co.

18 miles, 30-in., under way Middletown to Selmer, Tenn. Oklahoma Contracting Co.

35 miles, contracted, Campbellsville, Ky., to Danville, Ky. Western Pipe Line Constructors.

21 miles, 26-in., under way, Carter, Ky., to Ohio River. Western Pipe Line Constructors.

70 miles, 24-in., under way, Mercer, Pa., to Pigeon, near Coudersport, Pa. H. C. Price Co. 8-53.

60 miles, 24-in., under way, Pigeon, Pa., to Hebron field, Porter County, Pennsylvania. Bechtel Corp.

• **Texas-Ohio Gas Co.**—1,435 miles, 30-in., proposed, Hidalgo County, Texas, through Arkansas, Mississippi, Tennessee, and Kentucky on to Spencer, W. Va.

• **Trans-Northwest Gas, Inc.**—246 miles, proposed, International Boundary near Osoyoos, B. C., to Washington and Idaho.

275 miles, branch lines.

• **United Fuel Gas Co.**—50 miles, 20-24-in., proposed, Wood County to Lanham, W. Va. Spring 1954.

32 miles, 24-in., proposed, near Ripley, W. Va., to Lanham station, Putnam County, W. Va.

• **United Gas Pipe Line Co.**—44 miles, 20-in., planned, Lirette field to Harvey, La.

• **United Natural Gas Co.**—50 miles, 12-in., planned, Elk County to Jefferson County, Pennsylvania.

• **Utah Natural Gas Co.**—103 miles, 16-18-in., proposed, Clear Creek field near Price to Salt Lake City, Utah.

18-in., Clear Creek to Provo, Utah.

16-in., Provo to Salt Lake City, Utah.

Virginia Natural Gas Co.—153 miles, Buckingham to Richmond and Portsmouth, Va.

Warren Petroleum Corp.—78 miles, 2-24-in., proposed, Lovington, N. M. Completion date 9-53.

Westcoast Transmission Co., Ltd.—(See foreign natural gas pipe lines).

Western Slope Gas Co.—34 miles, 8-in., under way. Garmesa to West Douglas Creek, Colo. 8-53.

Foreign Crude-Oil Pipe Lines

Basrah Petroleum Co.—65 miles, 24-in., under way, Zubair to Fao, Iraq. Completion date 10-53.

• **Creole Petroleum Corp.**—25 miles, 34-in., planned, Lagunillas to La Salina (State of Zulia, Venezuela.)

Direccion General de Yacimientos Petroliferos Fiscales—409 miles, under way, Plaza Huincul to Bahia Blanca, Argentina.

• **Gaz de France**, 200 miles, 12-in. Ruhr to Paris, France.

Interprovincial Pipe Line Co.—135 miles, 24-in., under way, looping from Regina to U. S. border, Canada. Anderson International Contrs., Ltd. 8-53.

• **Petroleos Mexicanos.**—145 miles, 12-in., considered, 18 de Marzo field via Reynosa to Monterrey, Mexico.

100 miles, planned, Isthmus of Tehuantepec, Jose Colomo to El Plan field, Minatitlan.

72 miles, 12-in., proposed, Poza Rica to Atzacapotzalco, Mexico.

Petroleos Mexicanos.—125 miles, 10-in., under way, Jose Colomo to El Plan, Mexico.

• **Saskatoon Pipe Line, Ltd.**—56 miles, 6-in., planned, Milden to Saskatoon, Sask.

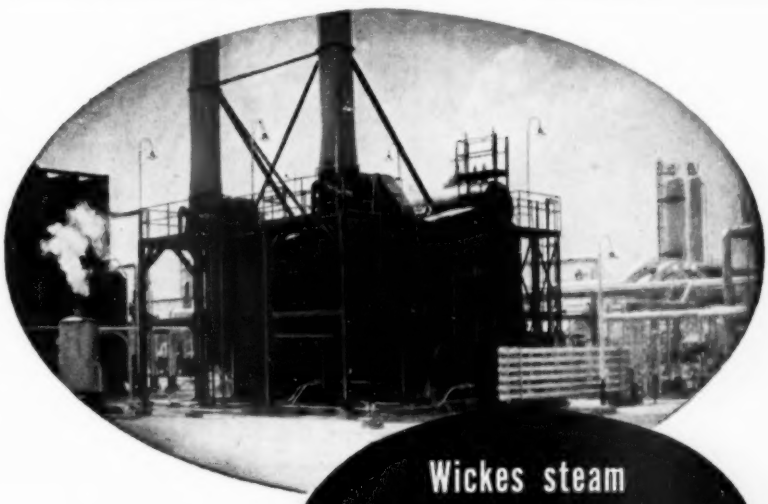
Texas Petroleum Co.—60 miles, 4-6-in., under way, Pta. Nino to La Dorada.

• **Trans Mountain Oil Pipe Line Co.**—30 miles, planned, Vancouver, B. C., terminal to Ferndale, Wash.

Trans Mountain Oil Pipeline Co.—711 miles, 24-in., under way, Edmonton, Alta., to Vancouver, B. C. Canadian Bechtel, Ltd., engineers. Completion date 8-53.

Edmonton to Acheson, Canadian Pipe Line Const. 8-53.

Jasper to Blue River, B. C., Comstock Midwestern. 8-53.



Wickes steam generators help refineries operate efficiently year after year

148

Year after year, Wickes Steam Generators have been helping the oil processing industry keep their operations efficient and their maintenance and operating costs low. They can do the same in your plant. Wickes can fill your requirements for any type of multiple drum boiler up to 250,000 lbs. steam per hour at 1000 psi., adaptable to any standard method of firing. Units capable of steam production up to 35,000 lbs. per hour at 1000 psi. can be shop-assembled for immediate installation. Consult your nearest Wickes representative or write us today for descriptive literature and complete information.

Wickes

THE WICKES BOILER CO. SAGINAW, MICHIGAN

Division of The Wickes Corporation • RECOGNIZED QUALITY SINCE 1854

SALES OFFICES: Albuquerque, N. M. • Atlanta • Boston • Buffalo • Charlotte, N. C. • Chicago • Cincinnati • Cleveland • Dallas • Denver • Detroit • Fort Wayne, Ind. • Greensboro, N. C. • Houston • Indianapolis • Los Angeles • Memphis • Milwaukee • New York City • Orangeburgh, S. C. • Pittsburgh • Portland, Ore. • Saginaw • Salt Lake City • San Francisco • Springfield, Ill. • Tampa, Fla. • Tulsa • Washington, D. C.

Controlled Drying...

Makes a Big Difference in Pipe Coating and Wrapping, Too!...

That's why PLS specialists provide scientifically-controlled drying ovens to bring steel pipe to the proper temperature and condition *before* protective materials are applied. It's one of the safeguards that give you more for your cleaning, priming, coating and wrapping dollar at PLS, where your steel pipe protection is always protected through the most modern *under-roof* facilities.

PLS

PIPE LINE SERVICE CORPORATION

Pioneers in Steel Pipe Protection

General Offices and Plant: Franklin Park, Illinois

Plants at Glenwillard, Penna.; Longview, Texas; Corpus Christi, Texas; Harvey, La.; Sparrows Point, Md.

Dependable Service Since 1931

Blue River, B. C., to Coquehalla, B. C., Mannix, Ltd. 8-53.

Chilliwack to Coquehalla, B. C. Comstock Midwestern. 8-53.

Sumas to Vancouver, B. C., Comstock Midwestern 9-53.

• **Yacimientos Petroliferos Fiscales Bolivianos.**—170 miles, 4-in., planned, Bermejo to Tupiza, Bolivia.

Foreign Products Pipe Lines

Colombian Ministry of Petroleum. — 115 miles, 4-in., begin 1953, La Dorada to Cartago, Colombia, Williams Bros. Engineers.

93 miles, 8-in., begin 1953, Cantimplora to Dorada, Colombia, William Bros. Constructors.

• **Empresa Nacional del Petroleo** — 80 miles, 6⅝-in., planned, Concon to Santiago, Chile.

Empresa de Ferrocarriles Ecuatorianos.—50 miles, 6-in., contracted, Guayaquil to Palmira, Ecuador. J. A. Jones, contractor; C.R.C. Engineering Co., engineers.

• **Governments of Southern Rhodesia and Portuguese East Africa.**—200 miles, considered, Beria, Portuguese Mozambique to Umtalia, Southern Rhodesia.

• **Petroleos Mexicanos.**—124 miles, 6-in., planned, Lagos to Guadalajara, Mexico.

54 miles, 6-in., planned, Lagos to Aguascalientes, Mexico.

82 miles, 8-in., planned, Salamanca to Lagos, Mexico.

• **Shell Co. of Australia.**—34 miles, 8-in., planned. Geelong, Melbourne Ref. to connect with installations at Newport, Australia. Taylor Woodrow. 11-53.

Sun Pipe Line Co. of Canada.—200 miles, 8-in., under way, Sarnia, Hamilton, Toronto, Ont. Williams Bros. 10-53.

• **United States Government.**—375 miles, 12-in., planned, St. Nazaire to Melun and Metz, France.

Foreign Natural-Gas Pipe Lines

•**Azienda Generale Italiana Petroli.**—110 miles, 12-14-16-in., Start 11-52. Cortemaggiore to Genon. Completion date 11-53.

Azienda Generale Italiana Petroli — 90 miles, 12-in., under way, Cortemaggiore to Bologna, Italy, SNAM crews.

120 miles, 16-in., under way, Cremona Porto Mar to Ghera, Italy, Montubi, contractor.

40 miles, 12-in., under way, Ripalta-Bergamo, Italy.

Direccion General del Gas del Estado—310 miles, 8-in., under way, Plaza Huincul to Neuquen, Argentina, to the vicinity of General Conesa, Argentina.

• **Empresa Nacional del Petroleo**—80 miles, 10-in., planned, Concon to Santiago, Chile.

• **Mid-Continent Pipelines, Ltd.**—1,860 miles, 30-in., proposed, Alberta to Montreal, Canada. Fish Engineering Co.

• **Northwest Natural Gas Co.**—950 miles, 24-in., planned, Alberta fields to Vancouver, B. C., Seattle, Wash., and Portland, Ore.

Petroleos Mexicanos.—205 miles, 16-in., under way, Monterrey to Torreon, Mexico.

• **Petroleos Mexicanos.**—440 miles, 20-in., planned, Brazil to Tampico to Poza Rica, Mexico.

• **Trans-Canada Pipe Lines, Ltd. (Canadian Delhi Oil Co.)**—2,247 miles, 14 to 30-in., proposed, Alberta to Toronto to Montreal.

747 miles, 8 to 24-in., gathering system in Alberta.

• **Westcoast Transmission Co., Ltd.**—1,110 miles, 24-in., planned, Dawson Creek, B. C., through Pine Pass and Fraser River Valley to Kamloops, Princeton, and Vancouver to Portland. Ford, Bacon & Davis, engineers.

280 miles, 20-in., planned, Pincher Creek to Montana on to Spokane, Wash. Ford, Bacon & Davis, engineers.

PIPE LINES

Texas-Ohio Appeals FPC Veto On 1,440-Mile Line

WASHINGTON.—Texas-Ohio Gas Co. has filed in the United States Court of Appeals for the District of Columbia a petition for review of the Federal Power Commission's order rejecting the company's application to construct a 1,440-mile natural-gas line from the Rio Grande to Lancaster, Ohio.

In its petition the company pointed out a number of errors it claims the FPC made during the proceedings, and requests the commission action be set aside. Initially, the FPC turned down the application last November when it claimed the company did not show that the $185,000,000 line was needed for "present or future public convenience and necessity."

During these proceedings Texas-Ohio said it would supply Reserve Natural Gas Co. in Ohio with 480,000,000 cu. ft. of gas daily secured from natural-gasoline plants, Texas gas fields, and Petroleos Mexicanos, Mexican Government oil agency. The commission, however, said Texas-Ohio had not signed a contract with Pemex nor submitted any gas-reserve and deliverability estimates on its proposed purchase from natural-gasoline plants. Also, the FPC declared no evidence was presented showing to whom and in what volume Reserve Natural intended to sell the gas it received *(The Oil and Gas Journal, November 17, 1952, page 439).*

The Ohio Public Utilities Commission said the FPC order was in error 47 different ways and that the commission did not consider Ohio's critical shortage of natural gas. Also, the group charged the FPC was wrong in demanding that the company prove it had "absolutely adequate supplies," pointing out no gas company serving Ohio has had adequate supplies for 5 years *(The Oil and Gas Journal, January 12, page 141).*

Standard Begins Construction On Dakota Products Line

BISMARCK, N. D.—Construction work was started last week on a 207-mile products line from Mandan to Fargo, N. D., and Moorhead, Minn., for Products Pipeline Co., a division of Standard Oil Co. (Ind.)

Roy Johnson, chief engineer, announced that the 10-in. line will be completed and ready for operation by December 1. Products Pipeline officials stated that the line will transport products from Indiana refineries into the Mandan-Bismarck area until the new 30,000-bbl. per day Mandan refinery of Standard Oil Co. (Ind.) is completed during 1954 at which time the flow will be reversed.

Associated Pipeline Contractors, Inc., of Houston, prime contractor on the project, is operating two trenching machines and is averaging from 3 to 3½ miles of trench a day.

J. L. Cox & Son of Raytown, Mo., subcontractor, is stringing the pipe.

Magnolia Plans North Texas Crude Line, Pump Station

DALLAS.—Magnolia Pipe Line Co. has announced plans to build a 154-mile 16-in. crude line from Ringgold to Corsicana, Tex., replacing a multiple 8-in. line system now in service.

The new line, which will have a capacity of 80,000 bbl. daily, will carry crude from North Texas and Oklahoma producing areas to the Corsicana terminus. It will be the first big-inch line laid by Magnolia since 1948 when the company completed its 647-mile, 20-in. line from Corsicana to Patoka, Ill.

In addition the company is planning to construct an all-electric main-line pump station plus two new 120,000 bbl. storage tanks at Ringgold. Construction of the station and line is expected to get under way immediately, with the entire project scheduled for completion by January 1.

L. J. True, president of the company, explained that construction of the new line was dictated by increasing crude-oil production in the Electra and North Texas areas and new oil production in Oklahoma.

Interstate to Construct Modern Pump Station

SHREVEPORT.—Interstate Oil Pipe Line Co. is planning to build a modern pump station about 8 miles south of here on the company's expanded Shreveport-Baton Rouge trunk line system.

Construction on the new station is expected to begin immediately and be completed in December. Work on station tanks, which will have a total working capacity of 815,000 bbl., will not be finished until early 1954.

Completion of the station and related trunk-line projects will provide

• Men, methods and equipment team-up for efficiency in pipe line construction.

HOUSTON CONTRACTING CO. LTD.
General Contractors
OIL • GAS • GASOLINE • WATER PIPE LINES
2707 FERNDALE • HOUSTON 6, TEXAS
GENERAL PARTNERS
LAURENCE H. FAVROT • R. P. GREGORY
ASSOCIATE
GEORGE A. PETERKIN

SAFETY-RELIEF VALVES
and
PRESSURE GAUGES
by
Lonergan

Extensive Selection
Modern Design
Accurate Construction

For years Lonergan Valves and Gauges have been widely used for oil field, refinery and pipe line service. Their dependable performance is well established. See your nearby Lonergan dealer for further information or write us for our Gauge or Valve Catalog.

J. E. LONERGAN CO.
• SINCE 1872 •
2ND and RACE STREETS
PHILA. 6, PA.
There's a Lonergan Distributor in your area.

Complete CORROSION PROTECTION Service

• Highest quality
magnesium anodes
• Complete Engineering and installation service.

AN-SPEC ANODES MANUFACTURED BY MAGNESIUM DIVISION OF M. J. CROSE MANUFACTURING CO., INC

PIPELINE Anode CORPORATION
25TH WEST AVENUE AND SAND SPRINGS RD.
P. O. BOX 996 • TULSA, OKLAHOMA

PIPELINE SUPPLY COMPANY
2230 Magnolia St. P. O. Box 7022
Birmingham, Ala. Houston, Texas

PROTECTO WRAP COMPANY
436 Douglas Blvd.
Los Angeles 12, Calif.

Let our horizontal Boring Equipment come to *your* rescue

We specialize in removing excess circumferencial weld material inside Pipe Lines and thus preventing the fouling of "go-devils" used to clear out surplus oil.

Other services include:
DESCALING WATER MAINS, GAS MAINS, BITUMEN LINES, COOLING CIRCUITS AND SLURRY LINES, BITUMEN LINING WATER MAINS. TREATMENT OF DISTILLED WATER TO MAKE IT POTABLE, CLEANING OF STEAM PLANT AND AUXILIARY SERVICES.

At your Service In Any Part of the World

General Descaling CO. LTD.

PLEASE NOTE OUR NEW ADDRESS
WORKSOP, NOTTS, ENGLAND

a new and modern crude system between the two cities with a daily capacity of 133,000 bbl. Also, completion of the projects will mean the retirement of the former Shreveport-Baton Rouge system and pump stations at Oxford, Flora, and Rapides.

The station, equipped with three electrically driven, 1,500-hp. centrifugal pumps, will receive oil from two lines in addition to tank-truck receipts. One incoming line, an 18-in. line now under construction, reaches to the Texas-Louisiana border and will handle Texas crude. The other, a 12-in. line, serves producing areas in northwest Louisiana and south Arkansas.

Salt Lake Plans to Increase Capacity of Products Line

SALT LAKE CITY. — Salt Lake Pipe Line Co. is planning an expansion program which will increase the capacity of its 566-mile products line between here and Pasco, Wash., by 20 per cent.

The project, which will cost some $1,700,000, will include a new pump station at Huntington, Ore., additional pumps at the company's Juniper, Idaho, and Baker, Ore., stations, the laying of 40 miles of 6-in. pipe between Adams, Ore., and Pasco, and erection of five 12,500-bbl. tanks at Boise.

Upon completion of the project, Salt Lake, a wholly owned subsidiary of Standard Oil Co. of California, will have a capacity of 42,500 bbl. daily from Salt Lake City to Boise and 22,500 bbl. per day from Boise to Pasco. Presently, the company is building an 8-in. products line from Pasco to Spokane which will have an initial capacity of 12,000 bbl. daily. Also, it is constructing a $4,500,000 terminal in Spokane *(The Oil and Gas Journal, July 6, page 123)*.

Line Application Withdrawn By Fredericksburg Natural

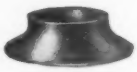
FREDERICKSBURG, Va. — Fredericksburg Natural Gas Co. has withdrawn its application seeking Federal Power Commission authority to construct a 29-mile line to supply the Fredericksburg area with natural gas.

The company had proposed to run a line from Fredericksburg to Culpepper County, Virginia, connecting with Transcontinental Gas Pipe Line Corp.'s system there. However, Fredericksburg Natural was unable to perfect arrangements for a firm supply of gas, and this caused the city of Fredericksburg to repeal the ordinance granting a franchise to the company.

See Composite and Refinery Catalogs, or Write for Folder On

FLEET-LINE
PIPE SADDLES AND REDUCERS

Nozzle sizes from 1/4" to 24" — ASTM A234


Also for pressure vessel heads

Nominal pipe sizes 1" to 24" — ASA B16.9, ASTM A234

Eccentric

Immediate Delivery
STEEL FORGINGS, Inc.
P. O. Box 276B • Shreveport, La.
Foot of Fannin Street

S. E. HUEY & CO.
ENGINEERS & SURVEYORS
HENINGER BLDG.
MONROE, LA.

SURVEYING & MAPPING

PIPE LINE SURVEYS

UP-TO-DATE PIPE LINE MAPS

"JACOBSON'S MAP SHOWING CRUDE OIL AND GASOLINE PIPE LINES OF THE UNITED STATES"

SHOWS: Crude oil pipe lines in blue—gasoline pipe lines in red—key refineries with capacity barrels crude oil per day—principal cities and towns. Pipe lines are indicated with dashes, dots and straight lines so that it is possible to trace individual pipe line systems. Pipe sizes are shown on pipe lines in Rocky Mountain area.
Size 54" x 76". Scale 1"=40 miles.

"JACOBSON'S MAP SHOWING NATURAL GAS PIPE LINES OF THE UNITED STATES"

SHOWS: Natural gas pipe lines are indicated with dashes, dots and straight lines so that it is possible to trace individual pipe line systems—major gas fields are shown in solid red and general gas areas are outlined in red—principal cities and towns.
Size 54" x 76". Scale 1"=40 miles.

Folder Sent on Request

E. C. JACOBSON, MAPS
315 Mayo Bldg. Tulsa, Okla. Phone 2-1952

NOW—offering the most complete pipeline equipment and supply service in North America

m.j. Crose
MANUFACTURING COMPANY, INC.

. . . and affiliated companies

- **M. J. CROSE MANUFACTURING CO., INC.**
  TULSA, PHONE 6-2172 • NEW YORK, PHONE BRYANT 9-2334
  DENVER, PHONE EMPIRE 6-0332
- **PIPELINE SUPPLY COMPANY**
  HOUSTON, PHONE TWIN OAKS 2356 • BIRMINGHAM, PHONE 54-1548
- **CROSE PIPELINE EQUIPMENT CO.**
  NEWARK, PHONE MARKET 4-3690
- **CROSE-CURRAN, LTD.**
  EDMONTON, PHONE 4-2340 OR 2-0224

NEW

Portable, Hydraulic
"GUILLOTINE"
CUTS 1¼" WIRE ROPE!

Guillotine Model 10A with Integral Hand Pump

Tremendous cutting power . . . 22½ tons thrust!

Light weight . . . only 45 lbs. net. Take the tool to the job.

Positive blade retraction . . . will not jam.

Easy hand pump action.

ALSO AVAILABLE WITH

Electric or Compressed Air operated pump

Automatic, power-operated pump assemblies available that are also portable or may be permanently mounted for production application. Special high-power pump available for production cutting over 200 cuts per hour.

Write For Catalog. Dept. OG 7B

MANCO MFG. CO.
BRADLEY, ILLINOIS

Stop Fires before they stop you

Use *Ampco Safety Tools* in hazardous locations

Employees do their best work when they know their tools are safe for the job. That's why you're money ahead when you insist on Ampco Safety Tools whenever there's a chance of fire or explosion — in spray booths, paint lockers, inflammable-liquid storage areas, or in the presence of explosive gases or dusts.

Factory Mutual Laboratories and other leading safety authorities know that the use of ordinary tools in hazardous locations often means disaster. That's why they approve and recommend Ampco Safety Tools for these spots.

Play safe! Use long-lasting Ampco Safety Tools. More than 400 different types and sizes. Order Ampco Safety Tools today for lower insurance rates, safer work, and better employee morale.

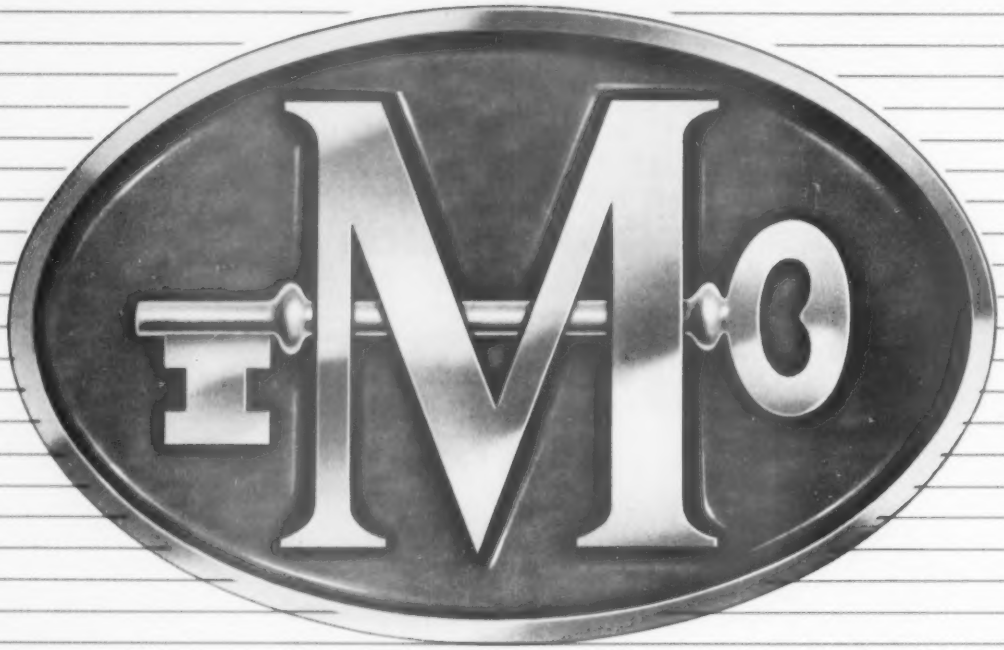
*Reg. U. S. Pat. Off.

AMPCO METAL INC.
Dept. OG-7
Milwaukee 46, Wis.

AMPCO®

West of the Rockies it's Ampco Burbank Plant, Burbank, California.
In Canada
Safety Supply Co., Toronto, Ontario

T-10A



McKee Engineering means ASSURED RESULTS

IN ANY transaction involving the high investment required to build a refinery there is no room for doubt about the ability of that refinery to produce up to specifications.

That's why major oil companies all over the world use McKee design, engineering, purchasing and construction services. Their own past experience with this organization and McKee's long, world-wide record of successful execution of contracts for all types of petroleum processing facilities are proof to oil men everywhere that *"McKee Engineering means Assured Results."*

ENGINEERING, PURCHASING AND CONSTRUCTION FOR THE PETROLEUM REFINING AND IRON AND STEEL INDUSTRIES

Arthur G. McKee & Company • Established 1905

Headquarters: McKee Building, 2300 Chester Avenue, Cleveland 1, Ohio.
Offices: New York • Tulsa, Oklahoma • Union, New Jersey • Washington, D. C.
British representatives of Metals Division: Head, Wrightson & Company, Ltd.
Canada: **Arthur G. McKee & Company of Canada, Ltd., 350 Bay St., Toronto 1, Ont.**

NATURAL GAS

Compromise Offered

Five-point plan may settle New England market fight

WASHINGTON. — Algonquin Gas Transmission Co. and Northeastern Gas Transmission Co. have worked out a compromise in their battle to supply the New England market with natural gas.

The proposal, which permits both companies to operate in the disputed area, will be heard by the Federal Power Commission July 17. The FPC reopened hearings recently in the controversy under orders from an appellate court.

The court action took place not long after the FPC gave Northeastern only half of a four-state area the company requested to serve. Later Algonquin was granted the other half of the disputed territory. Northeastern then went to court on the grounds it was not given a full hearing and asked the commission to explain why it deterred from its past policy of granting a whole area to one company. The court ruled for Northeastern and ordered FPC to reopen hearings. *(The Oil and Gas Journal, October 20, 1952, page 88).*

The agreement, which contains five points, makes the following provisions:

. . . **Algonquin** would serve all its proposed markets except Blackstone Valley Gas & Electric Co., Pawtucket, R. I. In return it would get Worcester Gas Light Co.'s Framingham division from Northeastern.

. . . **Texas Eastern Transmission Corp.** would supply Algonquin.

. . . **Northeastern** would service all markets in New Hampshire, Maine, and Massachusetts it had sought, except those listed in Algonquin's application.

. . . **Tennessee Gas Transmission Co.** would increase its sales to Northeastern. Also, it would serve Louisville Gas & Electric Co., North Penn Gas Co., and certain other intervening companies.

. . . **Niagara Gas Transmission, Ltd.,** of Toronto and Tennessee would be allowed to carry out plans for gas exportation to Canada.

Gas Price Order Upheld In Cabot - Phillips Case

OKLAHOMA CITY.—Ruling that orders of the Oklahoma Corporation Commission fixing minimum prices for natural gas superseded original contracts between producers and purchasers, the federal District Court here granted judgment of $387,282.37 to Cabot Carbon Co., Boston, and against Phillips Petroleum Co.

The suit involved a 1944 contract in which Cabot Carbon gave Phillips a block of leases in Guymon-Hugoton field, Texas County, Oklahoma, for development. Phillips agreed to pay Cabot 4 cents per 1,000 cu. ft. for the gas produced.

However, on January 1, 1947, the state corporation commission issued an order prohibiting production of gas in the Guymon area at a price less than 7 cents per thousand. The order was upheld in the state Supreme Court. Again, the price was raised by the commission on August 1, 1952. This time it was set at 9.8242 cents per thousand, and Cabot sued for the higher price.

The federal court ruled the producer is bound by the corporation commission rate and does not own the gas until it is produced, thus "the contract is superseded by the commission order."

Monsanto, Utah Chemical Plan Nitrogen Facilities

NEW YORK.—Two new plants for synthesizing nitrogen products from natural gas are planned by Utah Chemical Co. and Monsanto Chemical Co.

Utah Chemical, a newly formed firm in Salt Lake City, has applied for a certificate of necessity for an $18,800,000 ammonia plant for the south-central section of the state. In addition to anhydrous ammonia, the proposed plant will produce nitric acid and ammonium nitrate for agricultural fertilizers.

A $16,800,000 certificate of necessity has been granted Monsanto to construct new nitrogen facilities, probably near Texas City. However, it is understood that this project is part of a long-range plan, and early construction is not anticipated.

Hearing Held on Legislation To Free Distributors From FPC

WASHINGTON.—A hearing on proposed bills designed to free distributors of natural gas whose facilities and operations are confined within the borders of a single state from Federal Power Commission jurisdiction, have been concluded by a subcommittee of the House Committee on Interstate and Foreign Commerce.

Mainly the discussion revolved around the bill (H.R. 5976) introduced recently by Rep. Car Hinsaw of California, chairman of the subcommittee. Under the bill, a certification from the pertinent state regulatory commission to the FPC that the state body had regulatory jurisdiction over the intrastate gas firm would be required.

During the hearing Rep. Oren Harris, of Arkansas, asked if the pending proposals would provide exemption for a company which receives its gas just across the state line and transports a short distance across the state line into its home territory. Willard Gatchell, FPC general counselor, said a revision or amendment would be needed for proposed legislation to cover this situation. Walter McDonald, chairman of the Georgia Public Service Commission, said such an amendment had been prepared.

Kansas Gas - Measurement Order Protested in Suit

TOPEKA, Kans.—Three natural-gas companies have filed suit in District Court here protesting a Kansas Corporation Commission order controlling measurement of gas.

The companies, Cities Service Gas Co., Panhandle Eastern Pipe Line Co., and Kansas-Nebraska Natural Gas Co., Inc., claim the order will greatly increase their costs and are asking a declaratory judgment and injunctive relief.

The commission order, which took effect July 1, defines a cubic foot of gas as that volume of gas at a temperature of 60° F. required to fill 1 cu. ft. of space under an absolute pressure of 14.65 psi. Under the old method the pressure base is 16.4 psi.

The companies say the order increases the number of cubic feet about 11.95 per cent over the cubic feet in the same volume of gas under the old order. Therefore, they claim the companies are getting less gas for the same price, or are paying a higher price for the amount of gas.

Company Gets New Hearing On Serving Southern Markets

WASHINGTON.—The Federal Power Commission has granted South Georgia Natural Gas Co. a rehearing on its application to serve markets in Georgie and Florida.

Incorporated in the project is construction of a proposed 335-mile pipe line costing about $8,141,518.

The company's application was rejected May 4. However, since that time new facts have been presented the commission.

NATIONAL AIROIL
FUEL OIL - GAS
BURNERS SERVING INDUSTRY FOR 41 YEARS

- Steam Atomizing Oil Burners
- Mechanical Atomizing Oil Burners
- Low Air Pressure Oil Burners
- Rotary Oil Burners
- Industrial Gas Burners
- Combination Gas and Oil Burners
- Tandem Block Combustion Units
- Fuel Oil Pump Sets
- Refractory Burner and Muffle Blocks
- Valves, Strainers, Furnace Windows

Detailed information gladly sent you upon request.

Established 1912 — Incorporated 1917

NATIONAL AIROIL BURNER COMPANY, INC.
1236 East Sedgley Ave., Philadelphia 34, Pa.
S. W. Division: 2512 So. Blvd., Houston 6, Texas

Colorful, Durable DECALS
At a Fraction of the Cost of Hand-Painted Signs!*

*Some of Our Customers Report Savings as High as 70%!

Oil men are highly pleased with the way we design and produce their decals and save them money. They have learned that STAN RAMSEY Decals provide a better solution to their advertising, identification and decorating problems. They will tell you that our top quality decals do not necessarily mean high prices. Oil men have faith in our proven skill to deliver economically with SELLING RESULTS always in mind.

Our staff of decal specialists can supply you with an eye-catching design . . . any size . . . any lettering . . . in any colors . . . all at costs far below that of hand painting. Our decals are made for simple, quick application, yet will last for years. Why not write us today about your decal needs? We guarantee you'll be proud of the selling job our decals will do for your good name and product!

Stan Ramsey COMPANY, INC.
Designers and Manufacturers of DECALS
2727 NORTH OKLAHOMA AVE.
OKLAHOMA CITY, OKLA.

REFINING

Motor Oil Changes

A.P.I. lube classification adopted by auto makers

TULSA.—New service classifications for motor lubes, introduced last year by American Petroleum Institute, are receiving fairly rapid recognition from automotive manufacturers.

Replacing the former regular, premium, and heavy-duty classes with Service ML, MM, and MS designations, the new system bases selection of grades on the type of service involved rather than the characteristics of the oils themselves.

A 4-year comparison chart of lubrication recommendations by car makers recently compiled by Chek-Chart Corp. shows that of the 19 makes of cars made this year, 12 list the new service classifications in their owners' manuals. Of the 12, the 5 made by General Motors and the Studebaker show a distinct preference for recommending Service MS for all driving. Service MS is designed for severe driving conditions. Ford recommends all three for the services for which they are designated, while Lincoln and Mercury recommend MM for normal driving and MS for severe driving.

Little change is noted in the crankcase-drain intervals recommended this year. Out of 44 car models introduced, the 2,000-mile interval is recommended for 24. Nine model recommendations range between 2,000 and 3,000 miles for regular drain periods, while two are for 3,000-4,000 miles. Three Chrysler models and the new Dodge and DeSoto V-8's all recommend oil change on 5,000-mile intervals. Nearly all manufacturers qualify their recommendations by suggesting more frequent changes in cases of stop-and-go operation, dusty conditions and cold weather.

Increased lubricant demand is seen in the growing number of models equipped with overdrive, semiautomatic, and full automatic transmissions. The models equipped with overdrive and semiautomatic transmissions increased from 17 in 1950 to 22 in 1953, and those with automatic transmissions grew from 13 to 20. Of the 22 in the former class, 12 recommend the use of straight mineral gear lubricant, 6 specify 10 W motor oil, and 2 require extreme pressure lubricant.

All of the 20 current models with automatic transmissions carry the manufacturers' recommendations for the automatic transmission fluid (AF)—Type A, which is by now produced by a number of oil companies. The trend has been toward larger fluid capacity in the newer units, and 9 of the 20 this year require 10½ qt. or more for a change. Most transmission changes, however, are suggested at 25,000-mile intervals.

Power steering adds another point for lube-oil consumption. It has caught on quickly. Starting with Chrysler's two models so equipped in 1951, the number of models rose to 15 yast year and this year it is available in a total of 27 models put out by Buick, Cadillac, Chevrolet, Chrysler, DeSoto, Kaiser, Lincoln, Mercury, Nash, Oldsmobile, Packard, Pontiac and Studebaker.

Of the current models, AF is specified for 20, while the remainder do with 10 W motor oil. In 16 models, servicing of the power steering units is suggested every 1,000 miles with the remainder apparently making it for 5,000 miles before a required check.

Suntide's New Refinery Begins Taking Crude

CORPUS CHRISTI.—Suntide Refining Co.'s new 30,000 bbl. per day refinery here has started taking crude in preparation for vacuum and crude units going on stream in early August.

Connections have been completed to receive the crude from Magnolia Pipe Line Co., Humble Pipe Line Co., Southern Minerals Corp., and Sunray Coastal Pipe Line Co.

The remaining units are expected to be ready within 60 days after the crude and vacuum units go on stream.

Suntide, affiliated with Sunray Oil Corp., began work on the refinery over a year ago. Despite the steel shortages, the $15,000,000 project may be completed earlier than anticipated.

Texas Co. Granted Certificate On Jersey Refinery Addition

WASHINGTON. — The Texas Co. has been granted a certificate of necessity to cover the $12,500,000 cost of constructing two new processing units at the company's Westville, N. J., refinery.

Plans call for the construction of a 10,000-bbl. per day Platforming unit and a sulfuric acid alkylation plant capable of producing 1,500 bbl. daily of aviation alkylate. Also, additions to

tankage and utilities are planned. The project will be the first major addition to the 60,000-bbl. per day refinery since it was completed in 1949.

Rapid amortization has been approved on the following basis: $4,162,000 at 100 per cent; $5,538,000 at 65 per cent; and $2,800,000 at 45 per cent.

Ingram Products Reopening Former Gilcrease Refinery

NEW ORLEANS.—Ingram Products Co. is reopening the former Gilcrease Oil Co. refinery southeast of here at Meraux, La., with a $4,000,000 expansion and modernization project.

The revamped refinery, which was closed about 2½ years ago, is expected to be in operation in February or March. Improvements include installation of a Platforming unit with a charge capacity of 3,500 bbl. of gas-oil daily, plus gas concentration and vacuum units. Construction has started with Procon, Inc., in charge.

Upon completion crude capacity will be increased from its former 4,200 bbl. daily to an estimated 7,000 bbl. per day.

Quaker State Closes Refinery

OIL CITY, Pa.—Quaker State Oil Refining Corp. will shut down its refinery here for an indefinite period August 3.

Company officials said the order was necessitated by low wholesale prices for lubricating oils and loss of export markets. The 70-year-old refinery has a crude-charge capacity of 2,800 bbl. daily.

Petrochemicals

Celanese Starts Vinyl Acetate Shipments From New Plant

PAMPA, Tex.—Celanese Corp. of America has started shipping vinyl acetate 6 months ahead of schedule from its newly completed petrochemical plant here.

Construction of the vinyl acetate unit was started only 6 months ago. It is now capable of producing about 30,000,000 lb. annually.

The new unit produces acetate by means of a process which does not require acetylene as a feed. The product can be used for water-based paints, soil conditioners, and synthetic textile fibers. Also, it can be converted into many other chemicals. Chief among these are polyvinyl acetate; chemicals obtained by reaction with alcohols, formal, and butyral; and copolymers with vinyl chloride.

want Steel? CALL FLINT

"FLINT — YOUR STEEL DEPARTMENT STORE"

A COMPLETE SERVICE:
STEEL
FABRICATION
ERECTION
DETAILING

Flint provides a completely integrated industrial steel and fabrication service. ONE Call to Flint will secure everything you need — GALVANIZED and STRUCTURAL steel for substations, switch yards, transmission towers; WAREHOUSE steel, including hot and cold rolled bars, sheets and structural shapes; and PLATE steel for petroleum processing equipment. DELIVERY can usually be made from stock.

SERVING SOUTHWEST INDUSTRY SINCE 1915

FLINT STEEL CORPORATION
TULSA MEMPHIS

SJR SHORTSTIR Mixers with NEW MECHANICAL SEAL

for Pipe Line, Process and Refinery fluid agitation

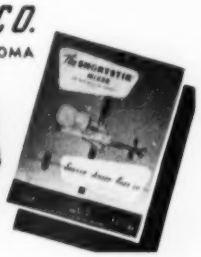
Where constant, reliable mixing is required – SHORTSTIR Mixers are the answer. Featuring a new stuffing box design with mechanical seal and self-lubricating shaft bushing – packing, packing leakage problems, and special lubricators are eliminated. For the utmost in mixer maintenance simplicity . . . investigate SHORTSTIR – specify SHORTSTIR!

SJR Sawyer-Jensen-Ross Co.
BOX 3156 WHITTIER STATION TULSA 4, OKLAHOMA

Write TODAY for Catalog.

SALES REPRESENTATIVES:
HOUSTON — Peddlers, Inc. • LOS ANGELES — William J. Beckett Co. • NEW YORK — J. Arthur Moore Co. • ODESSA — W. L. Somners Co. PITTSBURGH — Kerr Engineered Sales Co. SHREVEPORT — W. L. Somners Co. • TULSA — Morvin Thomas Co.

FREE



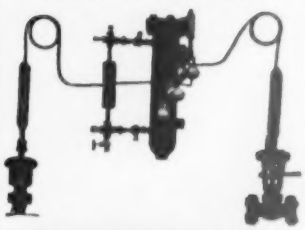
Get Full Joint make-up

A joint can be the weak link in your pumps, sucker rods and drill strings unless they are tightened to maximum make-up.

'Bestolife Lead Seal Tool Joint and Casing Compound keeps out mud, prevents corrosion, permits perfect thread and shoulder contact — yet separates easily years later. Unconditionally guaranteed. Sold at supply houses throughout the world. Packed in 1¼, 5, 20 and 50 lb. containers.

I. H. GRANCELL
1601 EAST NADEAU STREET
LOS ANGELES 1, CALIFORNIA

Completely Safe



INFERNO
Boiler Safety Unit

Boiler damage due to low water level just can't happen when you have an INFERNO Boiler Safety Unit. Here's why:

- Automatically controls water supply to maintain proper level.
- In case water supply fails, whistle blows at one inch below normal level.
- If whistle is unattended and water level drops another inch, fire is automatically cut off. Write for Bulletin 15-B.

THE INFERNO CO.
Box 1138A
115 RICOU St.
SHREVEPORT, LA.

Among the Drilling Contractors

Number of Operating Rigs Passes Last Year's Level

For the first time in more than a year, the weekly report on number of active rotary rigs in the United States and western Canada shows more rigs operating than during the corresponding week of the previous year.

This is due largely to the fact that at this time last year drilling was being drastically curtailed by the growing shortage of tubular goods brought on by the steel industry strike which began in June. Only with the steady upturn in drilling activity of recent weeks has the number of active rigs begun to get back to the relatively high levels reached before last year's curtailment of drilling was forced on the industry.

The latest rig report, covering the week ended July 6, lists 2,851 rigs in operation, 51 more than during the same week a year ago. The total still lacks more than 180 rigs of equalling the 1952 peak number of 3,032 rigs running early in June before the curtailment of drilling began.

ACTIVE ROTARY RIGS*

Area—	Week ended 7-6-53	Change week ended 6-29-53	Change week ended 7-7-52
Gulf Coast	592	− 9	+31
N. & W. Tex.-N. M.	839	+19	−47
Ark.-N. La.-E. Tex.	159	+17	+13
Oklahoma	342	+ 5	+31
Kans.-S. Nebraska	176	+17	+15
Illinois-Eastern	148	0	− 8
Rocky Mountains	269	+ 5	+35
Pacific Coast	170	− 1	+ 8
Total U. S.	2,695	+53	+78
Western Canada	156	−27	−27
Total	2,851	+26	+51

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States, Rocky Mountains, and western Canada are shown on pages 197 and 198.

Kern-Trimble Drilling Co. is contractor on a new Cotton Valley test which Lawton Oil Corp. is drilling in the eastern part of the Schuler field, western Union County, Arkansas. The new operation, 1-A Hunnicut-Sewell, SW SW SW 15-18s-17w, is contracted to 5,700 ft.

Wise Drilling Co. has a new wildcat test drilling for Rancho Oil Co. in Smith County, East Texas. Location is 3½ miles northwest of Lindale at 1 Perry, in the Martin V. Lout Survey. Hole is projected to 6,000 ft.

O. W. Killam, Laredo, Tex., is moving a light rotary rig to a wildcat location 25 miles northeast of Zapata, in Zapata County, Southwest Texas, where he will drill a Crockett sand exploratory test for Group Oil Co. of Houston at 1 Cuellar, in the GC&SF Survey 241. Location is 3 miles north of the

R. (Cotton) Makin (second from left), owner, Makin Drilling Co., Hobbs, N. M., and A. V. (Pete) Cagle (extreme left), assistant drilling superintendent, on a deep test the company drilled for Skelly Oil Co. at 5 Caylor, in the Lovington field, southeastern Lea County, New Mexico. With them are members of their daylight-tour crew, including, left to right: Huey Ingram, driller; H. J. Blount, motorman; D. S. Carson, derrickman; D. L. Wagner and Dillard Ellington, helpers. The picture was taken just after the well had reached its total depth of 14,153 ft. Since then, the hole has been plugged back to 6,246 ft., where the well has been completed flowing initially at the rate of 490 bbl. of oil per day.

SOME FOLKS CALL ME...

BAD BILL

...others call me "Sweet William". ★ Makes no difference to me just so they **call** me when they're needing any tongs or elevators or hooks or links or power tubing spiders—and **most especially** tong dies. ★ You see I sell those TIGER TOOTH Tong Dies made by Web Wilson, and man-to-man, if you're not using 'em YOU ARE NOT GETTING THE MOST SAFETY AND THE MOST WEAR for your money. ★ They have SOFT ends or HARD ends, as you prefer—they DO LAST LONGER—They DO GRIP, and they WON'T SLIP. ★ What are we waiting for? ★ The name is Wm. J. Davis—I get my mail at Box 4884, Oklahoma City (Zone 9) and my telephone number is 85-258. ★ I'd sure like to have **you** call me.

IN TULSA

and in the Oil Business — It's both Pleasant and Profitable to . . .

"Think...

FIRST"

An Oil Bank . . . directed by Oil Men in the oil capitol of the World.

1st of Tulsa

THE FIRST NATIONAL BANK AND TRUST CO. OF TULSA

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

West Jennings field, nearest production. Hole is projected to 3,600 ft.

Kirkwood & Morgan, Inc., San Antonio, has contracted with **Holmes Drilling Co.** for an outpost test for the Jennie Bell field, in DeWitt County, South Texas. The new operation, 1 Kuestet estate, in the SA&MG Survey 1, is 2,000 ft. northeast of the discovery, drilled by Kirkwood & Morgan for their own account and completed in an 8,000-ft. sand.

Tex-Mex Drilling Co., Dallas, has a contract with Southwest Gas Producing Co., Inc., of Monroe, La., for a 9,500-ft. Cotton Valley test to be drilled 2½ miles north of Springridge, in southern Caddo Parish, northwestern Louisiana. Location is for 1 Thigpen & Herold, in 30-16s-15w.

H. F. Hatcher & Son, Smackover, Ark., will drill a 3,000-ft. Paluxy wildcat test about 1¼ miles northeast of the Grogan field, Natchitoches Parish, in western Louisiana, on a contract with R. L. Murray, independent operator, Bossier, La. The test is 1 Louisiana Long Leaf, in 5-10n-10w.

Edwards & Bissett Drilling Co., Houston, is drilling on an 8,500-ft. contract it has with J. M. Flaitz and associates for a Cook Mountain test a mile northwest of Juanita, in Beauregard Parish, Louisiana. Location of the test, 1 Newport, is in 13-5s-11w.

Southern Production Co., Inc., Dallas, has a rig contracted to M. L. Mayfield Co., Houston, for a 13,000-ft. test to be drilled at 1 Continental, ¾ mile north of the Turtle Bayou gas-condensate field in Terrebonne Parish, coastal Louisiana. Location is in 21-17s-14e.

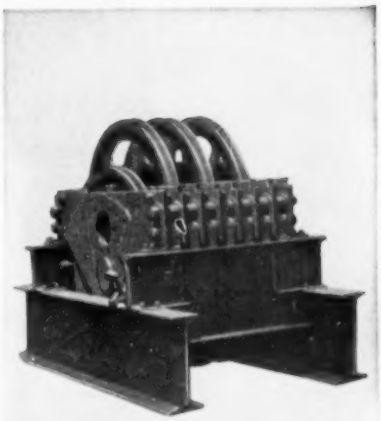
Bern Drilling Co. was the contractor on the gas-discovery well just completed by S. & M. Oil & Gas, Inc., of Saxonburg, Pa., in Rome Township, Athens County, Ohio. The well, located on the G. Y. Tedrow lease in Section 26, gaged 480,000 cu. ft. of gas daily from the Cow Run sand at 635 ft. Location is 2 miles west of good oil production found in the same sand.

Circle Drilling Co., Lake Charles, is starting a wildcat test for Vincent & Welch, Inc., Lake Charles producing firm with which it is affiliated, at the northwest edge of the St. Joseph townsite, in Tensas Parish, eastern Louisiana. The test, 1 Panola, in 37-11n-12e, is projected to 6,500 ft. or the top of the Midway.

STANDARD

OF THE PETROLEUM INDUSTRY

Since 1905



Regan type AN55

CROWN BLOCK

...built to stand up under the line speeds and loads applied by the largest drilling rigs. Ball bearings have been used to carry the thrust loads and further reduce the side drag on the sheaves. Heavy roller bearings carry the radial loads. The basic Regan design of a rotating inner race ring has been kept but the inner race ring of the roller bearings is mounted on the sheave hub. A bolt through the sheave hub pre-loads the ball thrust bearings and removes all side play from the sheaves. Positive lubrication to each bearing. Capacity—600 tons. *Write for informative bulletin.*

53

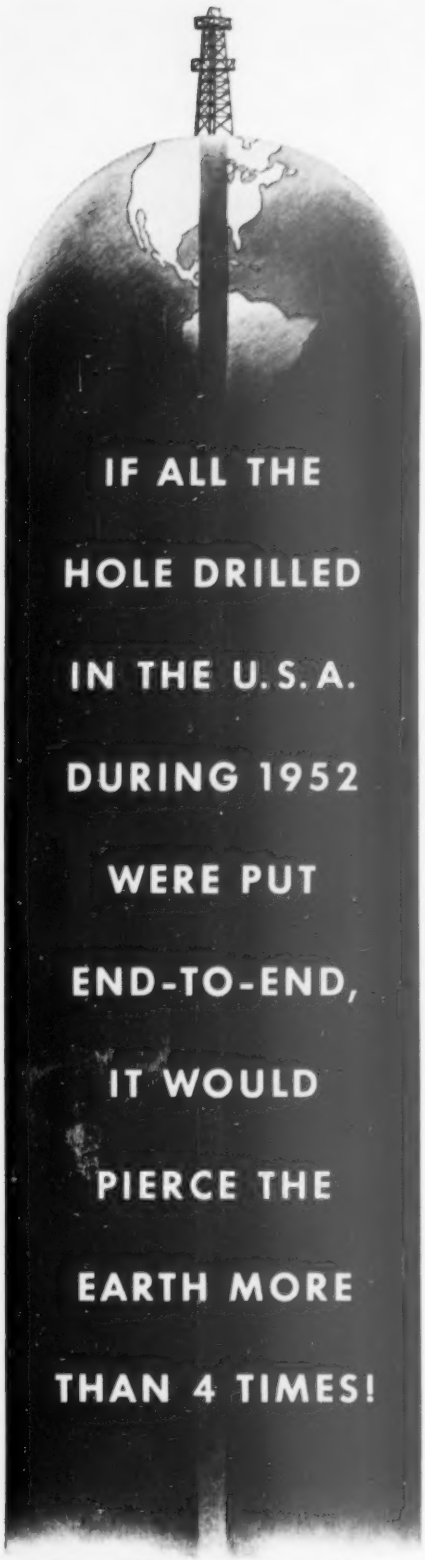
Regan

Forge & Engineering Co.

SAN PEDRO, CALIF.
FORT WORTH, TEXAS

Quality - Wrought on the Forge of Experience

Exclusive Mid-Continent and Export Distributor:
MID-CONTINENT SUPPLY CO.
General Offices: Fort Worth, Texas



A big part of the record **187** million feet of hole opened in 1952 was drilled by rotary rigs equipped with

DIAMOND ROLLER CHAINS

America's foremost manufacturers of oil field machinery have long used Diamond Roller Chains as regular equipment. Naturally these popular Diamond equipped rigs are preferred by leading contractors everywhere who drilled a large part of *over 35,000 miles* of hole made last year.

Manufacturers and contractors alike have proven through experience that the uniform high quality and outstanding performance of Diamond Roller Chains provide the efficient operation and long life necessary to economical drilling.

This year, with greater footage predicted, dependability and performance will be even more vital. It will pay you to specify Diamond Roller Chains.

Shot-Peening since 1944

Diamond Chain has long recognized that certain types of internal stressing of chain parts would increase fatigue resistance. To this end, link plates have been specially processed and chain rollers and other parts have been shot-peened since 1944.

DIAMOND CHAIN COMPANY, Inc.
Where High Quality is Traditional
Dept. 475, 402 Kentucky Avenue, Indianapolis 7, Indiana
Tulsa Office: 2238 Terwilleger Blvd.
Offices and Distributors in All Principal Cities
Please refer to the classified section of your local telephone directory under the heading CHAINS or CHAINS-ROLLER

DIAMOND ROLLER CHAINS

EXPLORATION

Another Tilted Water Table Proved

by Philip C. Ingalls

PROOF that the theory of tilted water tables has practical application has been definitely developed at the Sage Creek anticline in the Big Horn basin of Wyoming. Several million barrels of Tensleep oil have been proved on the west flank of this surface-expressed anticline which drilled out water bearing on top.

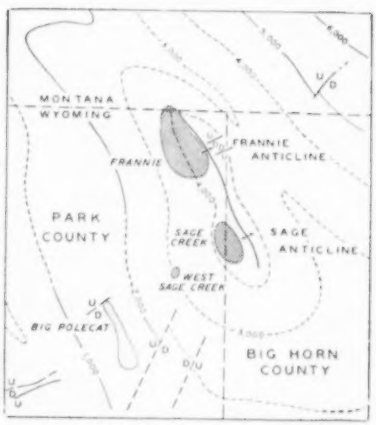
The Sage Creek flank discovery well, Sunray Oil Corp. 3 unit, 12-57n-98w, was located on the basis of the tilted-water-table theory.* This wildcat was completed in July 1952 flowing 244 bbl. of 25°-gravity black oil daily plus 20 per cent fresh water. Subsequent drilling on the flank has developed four oil wells and one noncommercial producer. These wells are spaced in such a way as to have indicated a productive area of 300 to 800 acres, all of which is downdip from the crest of the anticline.

As shown by the accompanying sketch based on a portion of the U. S. Geological Survey's Frontier-contoured map of the Big Horn basin, Sage Creek and Frannie anticlines are on the same structure but separated by a shallow saddle. Tensleep production at Frannie was discovered in 1928 on the west flank of the anticline after previous drilling had found the crest water bearing in that formation. Development of the Tensleep reservoir at Frannie, which has already shown a water table with 1,300 ft. of tilt, is still progressing westward downdip.

Now that four wells have been completed on the west flank of Sage Creek anticline in the same structural position as the oil field at Frannie, one wonders why west flank wells were not drilled before they were. Crest wells at both Frannie and Sage Creek found the Tensleep without oil, but at Frannie, where the oil proved to be trapped high on the west flank, drilling proceeded to develop a pool "hung" on the side of the structure. Except for Shell Oil Co.'s May 1952 discovery at West Sage Creek which is on a seismic high well downdip, Sage Creek's flank was neglected until Sunray drilled its discovery well.

Though the Sage Creek Tensleep discovery was the first announced successful attempt at a wildcat based solely on the tilted-water-table theory, there have been several other attempts to find such displaced oil pools during the past year or so. Sage Creek proves that the tilted-water-table theory offers a practical tool for the geologist but at the same time other attempts applying the theory show that it is certainly no cureall for the headaches of the Rocky Mountain geologist.

*For a simplified summary of the theory see page 215 in the April 14, 1952, issue of the Journal.



Structural setting of Sage Creek and Frannie.

Tilted water tables have been recognized in the Rocky Mountains and in other parts of the United States for many years. However, it has been only during recent months (specifically, since March 1952, when M. King Hubbert of Shell dramatically demonstrated what he had mathematically proved) that there has been much exploratory application of the knowledge that tilted water tables do exist without lithologic barriers to updip migration.

An excellent example of a tilted water table in the Big Horn basin is presented on page 178. It was the study, which began in 1950, that resulted in this paper which instigated the discovery of the offstructure oil pool at Sage Creek.

Some objections to the theory of tilted water tables have been raised by geologists in the Rocky Mountains. There can be little doubt that objections are valid in many specific cases. On the other hand, the discovery well of Sage Creek-Tensleep, the location for which was based solely on the theory of hydrodynamically trapped oil, is proof that tilted water tables definitely must be a consideration in exploratory work in areas where they are theoretically possible.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

WEST TEXAS . . . Gulf Oil Corp. 1 Lea, Crane County Ellenburger discovery, has been completed for 1,254 bbl. of oil daily, based on an 8-hour flow of 418 bbl. through 14/64-in. choke. Luse & Ice 1-A Brictson, Devonian discovery in the Payton field, rated a calculated potential of 105,000,000 cu. ft. of gas daily plus 28.5 bbl. of high-gravity distillate per 1,000,000 cu. ft. Crown Central Petroleum Corp. 1 Broz, Ellenburger prospect 11 miles southeast of San Angelo, flowed an estimated 30 bbl. of oil an hour on test from 5,235-5,410 ft.

UTAH . . . El Paso Natural Gas Co. has completed the Peters Point gas discovery in Carbon County for a flow of 2,120 M.c.f. of gas per day through open tubing in the Wasatch. The discovery is 25 miles southeast of Duchesne field in northeastern Carbon County.

TEXAS GULF COAST . . . John W. Mecom has opened new oil production in Orange County with the completion of 1 First National Bank of Orange unit for a flow of 241 bbl. of 38.6°-gravity oil per day. The discovery is 4 miles north of Orange and 2 miles northeast of Echo field in the R. Ballew Survey A-2. The well was perforated with 12 shots from 8,700 to 8,702 ft. and potentialed through an 8/64-in. choke under a tubing pressure of 1,500 psi. Gas-oil ratio was 858:1.

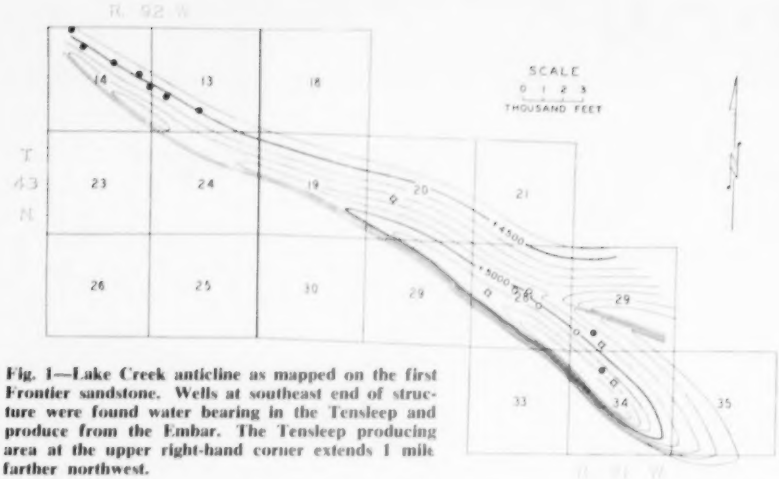


Fig. 1—Lake Creek anticline as mapped on the first Frontier sandstone. Wells at southeast end of structure were found water bearing in the Tensleep and produce from the Embar. The Tensleep producing area at the upper right-hand corner extends 1 mile farther northwest.

T. H. GREEN

C. W. ZIEMER

Thom H. Green, chief geologist for Fargo Oil Co., Calgary, was with Sunray Oil Corp. until July 1 of this year.

C. W. Ziemer is reservoir engineer with Sunray in Tulsa.

GEOLOGIC STUDY EXPLAINS

Tilted Water Table at Northwest Lake Creek Field

This is an abstract of "Northwest Lake Creek Area, Hot Springs County, Wyoming," a paper by Thom H. Green and C. W. Ziemer, which will be published in full in the Bulletin of the American Association of Petroleum Geologists.

NORTHWEST Lake Creek oil field is located on the southwest flank of the Big Horn basin approximately 20 miles northeast of Thermopolis, Hot Springs County, Wyoming.

This field is on the northwest plunge of the elongate and asymmetric Lake Creek anticline, the axis of which is expressed by Cretaceous sandstones on the surface. This structure can be mapped for more than 9 miles but displays an average maximum width of only ½ mile. Lake Creek is typical of Big Horn basin anticlines in that the steep southwest flank is mountainward and the northeast limb dips gently basinward.

Wells at Northwest Lake Creek field are drilled approximately 1,200 ft. northeast of the surface anticlinal crest in order to intersect the crest at the Tensleep sandstone, the producing horizon.

Neither surface rocks nor subsurface data indicate the presence of faulting which could explain the accumulation approximately 500 ft. structurally below the anticline's apex. Pressure and fluid characteristics preclude discontinuities of the reservoir by litho-facies change.

The Tensleep reservoir is badly fractured, both vertically and horizontally, along the anticlinal axis and water has been pulled along these channels through oil-saturated sandstones into the bore holes. It is shown by computation that "fracture coning" has drawn water as much as 44 ft. above the true oil-water interface. Capillary-pressure analysis indicates that water can be lifted about 15 ft. through a permeability change from 200 to 10 md.

The oil-water interface at Northwest Lake Creek is not a horizontal plane but a warped surface with an inclination of almost 400 ft. to the northwest. This deviation from the horizontal probably results from the nonstatic state of the reservoir waters which are computed to be flowing below the oil at the startling rate of 4.8 ft. a year or 0.16 in. per day.

Once a Great Oil Pool

Geologic history suggests that at the close of Laramide time the Lake Creek anticline must have been similar to the large anticlines in the Mid-Continent with the interstices of the sediments filled with saline waters and with oil and gas confined in the Tensleep sandstone in conventional relationship with the geometry of the structure. Subsequent replacement of saline formation waters by meteoric waters and related flow forced the gas and much of the oil from the crest of the anticline. A small portion of the oil found a position of rest in the energy field at a small and local culmination along the anticlinal plunge forming Northwest Lake Creek field—a residual "blob" of a once-great oil field having been saved by a fortuitous series of events.

To date, 13 wells have been completed from the Tensleep sandstone and 3 wells from the Phosphoria (Embar) limestone at Northwest Lake Creek field. Since its discovery in 1949, the field has produced about 1 million barrels of oil.

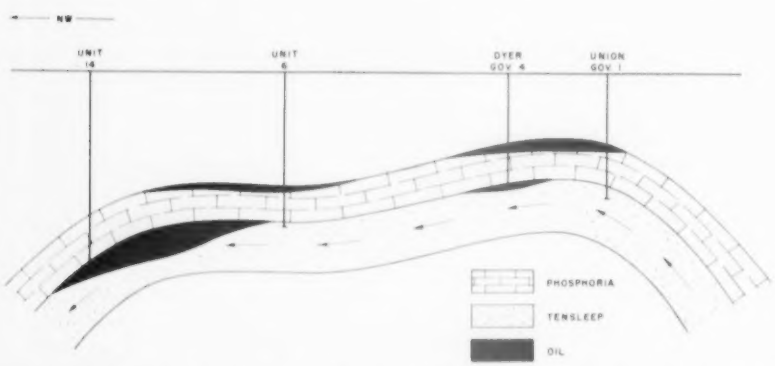


Fig. 2—Diagrammatic cross-section of Northwest Lake Creek field showing location of oil accumulations.

MONDAY, JUNE 15, 1953
Phillips Increases Crude Price to Bolster Hunt for Reserves
Higher Wages, Drilling Costs Behind Need for Action; No Response From Others
'Book Burning' Brings Reply McCarthy
Phillips Petroleum Co., effective at 7 a. m. today, increased its posted price 25 cents per barrel on all grades of crude oil at all points in Texas, Oklahoma, Kansas, New and Colorado where purchase prices are posted by S. Adams, chairman, and Paul Endacott,
News Buoys Oil Stocks
Increase in Crude Price Brings Gains
FINAL
HOME
The T
VOLUME XLIX—NUMBER 225
Seven More Big Firms Raise Crude Oil Prices
General effectiveness of the 25 cents a barrel increase in crude oil prices initiated Monday by Phillips Petroleum Co. seemed assured today when other major purchasers met the advance, following similar action Humble Oil & Refining Co., largest crude oil producer and Stanolind Oil Purchasing Co.
Oilmen Enthusiastic About Price Increase
Product Rise Need Tied to Crude Advance
Washington Bureau
WASHINGTON, June 15—The Independent Refiners Association of America said here today that upward adjustments in product prices should accompany a general crude oil price advance to prevent "increasing the squeeze" on refiners.
MORE BUYERS HIKE PRICES
OIL MUST BE DISCOVERED!

SSC

World-wide Experience

Seismograph Service Corporation

Seismic Surveys — Gravity Surveys — Pilot Crews — Lorac

TULSA 1, OKLAHOMA, U.S.A.

Tilted Table Moves Down Dip to Murphy

Tensleep production in the Murphy dome field of Hot Springs County, Wyoming, is assured a ¼-mile northwest extension by Farmers Union Central Exchange. Last week their 1 Government-Rose, SW NE NE 1-43n-92w, was testing after perforating at 4,544-4,639 ft., 4,654-4,679 ft., and 4,695-4,715 ft. following three successful drill-stem tests in the Tensleep formation.

In this well, 86 ft. of Tensleep oil saturation has been cored to a level as much as 126 ft. below the formerly accepted oil-water interface and no water has been logged to the present plugback depth of 4,731 ft. Total depth is 4,750 ft.

Murphy dome, another example of a displaced oil pool in the Tensleep reservoir, has a vertical component of as much as 176 ft. in its water level. (See article on page 178.) Current production from 6 wells in the Tensleep reservoir is 1,423 bbl. of 34°-gravity oil.

The field was discovered in November 1949 by Farmers Union 1 Shad. The discovery well on this elongated anticline, with a closure of 300 ft., penetrated some 200 ft. of Madison before it was plugged back to the Tensleep for an oil well.

ROCKY MOUNTAIN

MONTANA

McCone County Wildcats Plugged

Amerada Petroleum Corp. and Stanolind Oil & Gas Co. have abandoned two joint ventures on the west side of the Williston basin in the general Richey area of McCone County. Well 1 State, C NW SE 36-18n-49e, in the Lindsey area was dry at total depth of 10,781 ft. in Ordovician. NPRR 1 C SE SE 5-20n-48e, in the Southwest Weldon area was abandoned at total depth of 9,392 ft., with top of Cambrian logged at 9,348 ft. No shows of any significance were reported in either of the two wildcats. The two joint ventures with Stanolind were the first of the Montana side of the basin for Amerada and both were on land controlled by Northern Pacific Railroad.

NORTH DAKOTA

Amerada Continuing Tests At Fryburg Discovery

Amerada Petroleum Corp. has cored ahead below 9,466 ft. at 1 May, C NW NE 9-139n-100w, in the Fryburg area of Billings County, North Dakota and is now running drill-stem tests of an undisclosed interval below that depth. The wildcat is regarded as the most important discovery on the North Dakota side of the Williston basin since the discovery of oil in the state. The most recently reported test of the upper Madison was a recovery of 204 bbl. of oil and 65 of water in a 24-hour period from the interval 9,403-9,466 ft. Amerada has not disclosed the present depth of the well.

Further test of the 1 Yttredahl, C SW NE 33-154n-95w, apparent new field opener in northern McKenzie County has indicated a potential of 144 to 149 bbl. of oil and 13 to 24 bbl. of water per day with the flow through 24/64-in. choke. Production is from the Madison which was topped at 8,052 ft. Gravity of oil produced is 43.2°.

UTAH

Utah Gas Discovery In Dakota Testing

Three States Natural Gas Co. has moved off rotary and is continuing to test at 1 Kearns, SE NW NE 27-16s-6e, in the Flat Canyon area of Emery County. The wildcat test gas at the rate of 3¼ million cu. ft. per day from the Dakota topped at 7,002 ft. It is south of Clear Creek field where Ferron sand reserves are rapidly being developed by Three States.

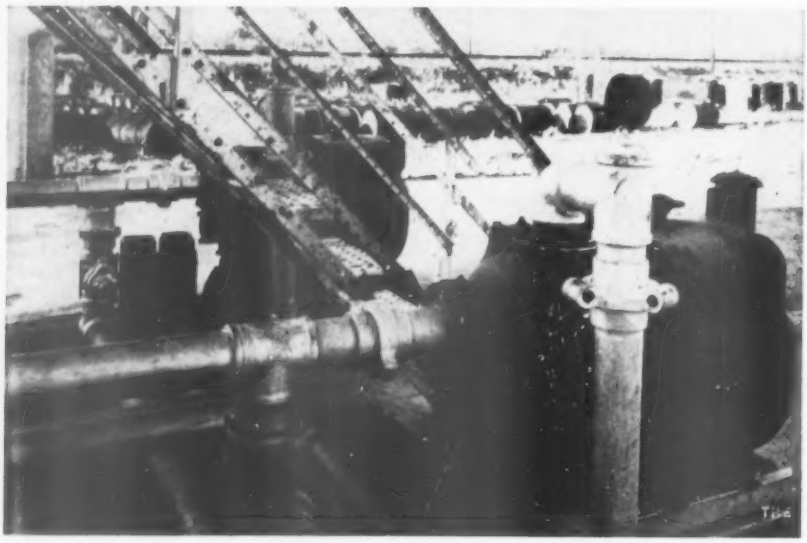
Peter's Point Gas Discovery Completed

El Paso Natural Gas Co. has completed 2 Unit, SW NE SW 36-12s-16e in the Peter's Point area of Carbon County for a flow of 2,120,000 cu. ft. of gas per day with production from the Wasatch which was topped at 2,780 ft. Flow was through open tubing.

CMC

Pumps

. . . . FOR THE OIL INDUSTRY



Exclusive twin priming advantages give C.M.C. Dual Prime Pumps longer life, minimum maintenance and outstanding operating performance.

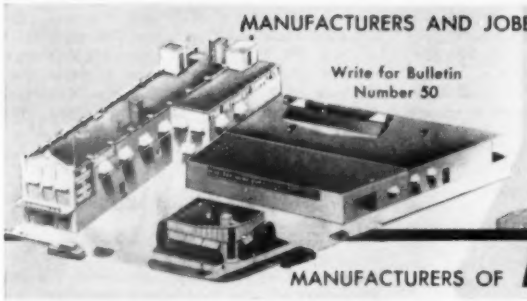
They are simple, rugged, fool-proof—and every pump is tested under most severe conditions.

Automatic priming speed on lifts up to 25' is unmatched. Sizes 1½" to 10"—3,000 to 240,000 G.P.H.

Write today for full details — our qualified engineers will gladly help solve your pump problems.

Two C.M.C. Dual Prime Model 420 Pumps loading lub-oil for Mid-Continent Petroleum Corporation at Odessa, Texas.

CONSTRUCTION MACHINERY COMPANIES
WATERLOO, IOWA



MANUFACTURERS AND JOBBERS OF **SCIENTIFIC INSTRUMENTS**

Write for Bulletin Number 50

MANUFACTURERS OF **Ac-Me & R. S. SPECIALTIES**

Ac-Me RECORDING GRAVITOMETER
Ac-Me SPECIFIC GRAVITY GAS BALANCE
Ac-Me PRESSURE VACUUM PUMP
R. S. PORTABLE VACUUM PUMP
R. S. MERCURY CLEANER
R. S. MANOMETER
R. S. DEAD WEIGHT GAUGE
R. S. DEAD WEIGHT TESTER
R. S. ORIFICE WELL TESTER
R. S. MOISTURE TESTER
R. S. FLAT BORE YEL-O-BAK THERMOMETERS
R. S. STREAMLINED HYDROMETERS
R. S. PULSAMETER
R. S. PRESSURE HYDROMETER JARS
R. S. VAPOR PRESSURE BOMB
R. S. DIAMOND CORE DRILL
R. S. THERMO PLUMB BOB THERMOMETERS
R. S. THERMOSTAT TEMPERATURE CONTROLS
R. S. HIGH PRESSURE CONSISTOMETER
R. S. SMOKE METERS

COMPLETE LINE OF SCIENTIFIC LABORATORY EQUIPMENT INCLUDING CENTRAL SCIENTIFIC SPECIALTIES

cenco

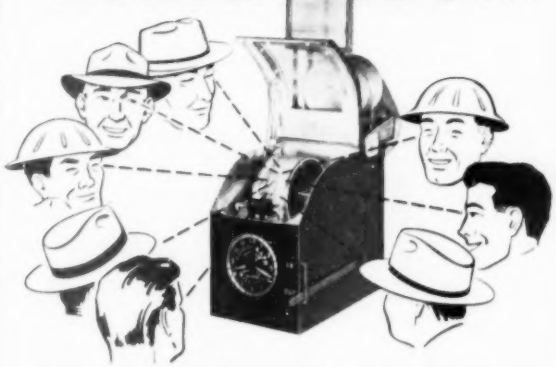
Cenco . . . one dependable source of supply for everything you need in scientific instruments and laboratory supplies. Over 15,000 items . . . 14 branch offices and warehouses.

R.S.G. TULSA

REFINERY SUPPLY COMPANY
621 EAST FOURTH STREET • TULSA 3, OKLAHOMA
2215 McKINNEY AVENUE • HOUSTON 3, TEXAS

CENTRAL SCIENTIFIC COMPANY
1700 IRVING PARK ROAD • CHICAGO 13, ILLINOIS
CHICAGO NEWARK BOSTON WASHINGTON DETROIT SAN FRANCISCO
SANTA CLARA LOS ANGELES TORONTO MONTREAL VANCOUVER OTTAWA

EVERYBODY...



appreciates Geolograph's up-to-the-minute, foot by foot record!

Whether you're a Geologist, Engineer, Superintendent, Contractor, Toolpusher, Driller or the Operator . . . you'll profit by taking advantage of this detailed record, made available on the well while drilling!

GEOLOGRAPH TIME

GEOLOGRAPH
MECHANICAL WELL LOGGING SERVICE
P.O. Box 1291 • Oklahoma City 1, Okla.

Farmington, New Mex.—Liberal, Kan.—Oklahoma City, Oklahoma
Abilene, Houston, Odessa, Lubbock and Wichita Falls, Texas
Bakersfield, Cal.—Shreveport and Baton Rouge, La.
Casper, Wyo.—Glendive, Mont.—Sterling, Colo.
Calgary and Edmonton, Alberta, Canada
Regina, Saskatchewan, Canada

OIL FINANCING

Our technical and financial knowledge of the oil industry is available to principals of independently or family owned oil and gas properties. If you are contemplating a loan against present production or considering the acquisition or sale of producing holdings, our specialized experience may be helpful.

C. LESLIE RICE, JR.
Vice President

J. F. DOUGHERTY
Vice President

Oil Department

Empire Trust Company
7 WEST 51st STREET
at Rockefeller Center, New York, N. Y.

The wildcat went to a total depth of 4,984 ft., and was plugged back to 3,231 ft. for completion. It is the second wildcat to be drilled in the unit which was approved in 1952 with Cities Service Oil Co. as the operator. Cities Service farmed out the area to El Paso Natural Gas. The first wildcat in the unit had shows through a thick interval, but none of them proved commercial.

WYOMING

Mountain Confirmation Nearing Critical Depth

Stanolind Oil & Gas Co. is drilling below 5,316 ft. at 2 Unit, C SW NW 11-12n-103n in the Middle Mountain unit, Sweetwater County. Top of Mesaverde is expected at about 7,500 ft. The well is a confirmation effort to a discovery in this formation which the operator completed late in 1952 as the first production from this formation in this area of Wyoming. The opening of the Mesaverde as a potentially important producing horizon in the Green River basin stimulated immediate leasing and further exploration of the area. The Middle Mountain unit discovery, ¼ mile northwest of the present well was completed for 169 bbl. of oil and more than a million cubic feet of gas per day from the zone 6,534-44 ft. It is the world's highest producing well with a ground elevation of 9,050 ft.

COLORADO

Third Twin Buttes Unit Wildcat Testing Dakota

Mendota-Greenbrier Oil Co. are testing in Dakota at 1 Kelly, SW NE 29-5s-102w, in the newly approved Twin Buttes Unit, in Garfield County. Total depth is 5,811 ft. with top of Dakota at 5,714 ft. Results of tests have not been announced. The unit includes more than 90,000 acres, and two previous discoveries have been completed within the unitized area. This operator has completed commercial gas wells in both Morrison and Entrada zones in the area, but has had no previous Dakota production in previous drilling done in the area.

The original Twin Buttes discovery was completed in 1951, with the second pay zone found in 1952. The unit includes acreage in both Garfield and Rio Blanco counties, and is directly south of Rangely field.

KANSAS

Nine New Pools Named In Seven Counties

The Kansas Nomenclature Committee of the Mid-Continent Oil and Gas Association has given names to eight new oil pools and one new gas pool in Kansas.

Central Kansas uplift . . . On the Central Kansas uplift Barton County has a new oil pool at Carl Boxberger 1 Weikert, SE SE SE 36-18s-12w. Weikert pool's discovery well was completed for 266 bbl. of oil per day from the Lansing. Francis Oil & Gas Co. 1 Wassinger, SW NW SE 10-15s-18w, is the pool opener of Leiker Northwest pool. The pool opener is in the process of completion from the Arbuckle. Stafford County has two new oil pools, Prairie Home South, opened by Lee Phillips Oil Co. 1 Nixon, NW SW NE 11-21s-13w, for 376 bbl. of oil per day from the Lansing, and Radium Townsite pool, opened by Natural Gas & Oil Co. and Sinclair Oil & Gas Co. 1 Estes, NE SE NW 5-22s-14w, finaled in the Arbuckle.

On the southwest flank of the uplift Pawnee County has a new oil pool at Evers Northeast. The discovery well is Petroleum, Inc., 1 Hauser, SW SE NE 31-21s-15w, finaled with a flowing potential of 48 bbl. of oil per day from the Arbuckle.

Southern Kansas . . . Cowley County's new pool is Stayton, opened by Laura Jane Oil Co. 1 Hoornbeck, SE SE NW 5-33s-4e, for a flow potential of 234 bbl. of oil per day from the Bartlesville.

Eastern area . . . At the extreme south end of the Salina basin McPherson County has two new oil pools, Lively South, opened by John J. Darrah 1 Boese, SE NW NW 34-19s-2w, for 108 bbl. of oil per day from the Mississippi, and Groveland pool, discoverd by Anschutz Drilling Co. at 1 Fleming, SE SE NE 10-20s-4w, a Viola strike.

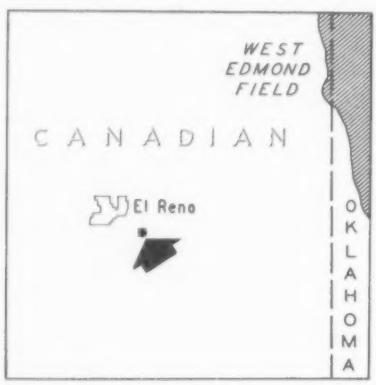
Hugoton embayment . . . In southwestern Kansas United Producing Co. opened Harper Ranch pool at 1 Harper Ranch, C NW SE 9-34s-21w. The gas discovery was completed for 6,000 M.c.f. of gas per day from the Morrow sand.

OKLAHOMA

Two Wildcats Lead Garvin Activity

Superior Oil Co. is drilling ahead after taking a core at its Garvin County wildcat, the 1 Reeves, C SE SW 21-4n-4w. Recovery on the core taken at 8,303-33 ft. was 9 ft. of sand with fair porosity, good fluorescence and odor. The indicated discovery well is 1¼ miles northwest of South Erin Springs pool. Superior is completing 1 Hughes-Shay in the pool, NE SW Section 27, from perforations at 9,052-56 ft. and 9,067-96 ft. after swabbing recovered 172 bbl. of oil per day.

Three miles east of East Antioch pool Cities Service Oil Co. is going ahead after finding good show of oil on test at 1 Radden "C," SE NW SW 22-3n-1w. The possible discovery showed gas at the surface in 9 minutes at the rate of 50 M.c.f. per day and recovered 185 ft. of heavily oil and gas-cut mud with free oil on test at 4,403-38 ft. The wildcat will go to the Oil Creek sand, or 5,900 ft.



Arrow points to El Reno gas-distillate pool in Canadian County which was extended to the southwest by completion of Sinclair Oil & Gas Co. 1 Community Wise unit, NW SE SW 14-12n-7w. The well was completed flowing 7,130 M.c.f. of gas per day through 1-in. choke from perforations in the second Wilcox sand at 10,320-420 ft. The new success is ⅝ mile southwest of the pool's discovery well, Sinclair et al 1 Hutcheman, NW NE SE Section 14, which was completed in 1952 for 47 bbl. of condensate and 10,300 M.c.f. of gas per day from the second Wilcox sand.

New Pay at Southwest Navina Is Layton Sand

Logan County's new Southwest Navina pool, opened last winter by Macmillan Petroleum Corp., has a new pay discovery, the Layton sand.

Macmillan, Blackwood & Nichols, and Richard S. Rheem 4 Krout flowed 16 bbl. of 44.5°-gravity oil per hour on a drill-stem test at 5,136 to 5,200 ft. in the Layton sand. Gas was less than 500 M.c.f. per day, which surfaced in 7 minutes, while oil flowed in 1 hour and 29 minutes. The high gravity oil flowed through a ½-in. bottom hole choke, and a ⅝-in. surface choke. This makes the third productive sand the trio has discovered in the Logan County field, the 1 Krout producing from the second Wilcox, the 1 Berg from the Simpson dolomite, and the 4 Krout assuring Layton sand production. Operators are drilling ahead to complete exploration of all sands.

NEW MEXICO

SOUTHEAST NEW MEXICO

Delaware Basin Test Has Gas Show

Richardson & Bass 1 Fidel-Federal reported a flow of 50,000 cu. ft of gas per day on drill-stem test from 12,231-12,337 ft., and was drilling ahead below 13,616 ft. in shale. Drill-stem recovery was not disclosed.

The same operator's 1 Cobb-Federal continued testing on perforations in the Delaware Mountain section around 7,000 ft. First test gaged 60.6 bbl. of oil with no water in 10 hours through ¾-in. choke. Another report credited the well with making 88 bbl. of oil and 34 bbl. of water in 24 hours.

Richardson & Bass 1 Harrison-Federal was drilling lime and shale at 14,833 ft.

Eddy County . . . Stanolind Oil & Gas Co. 1 AB State, Empire field deep test, was drilling cherty limestone below 11,103 ft. Tentative top of the Devonian was 11,065 ft. on elevation of 3,717 ft., and drill-stem test in the top at 11,068-11,087 ft. recovered water blanket and some drilling mud with no shows.

Stanolind and Gulf 1 Guadalupe Foothills Unit, 1 mile southwest of Carlsbad, was drilling sandy shale below 12,505 ft. This well has had gas shows up the hole. Location is on the northwestern rim, as presently identified, of the Delaware basin.

Lovington Test Plugged Back for Completion

Skelly Oil Co. 5 Caylor, deep exploration in the Abo (Wolfcamp), producing section of Lovington field, Lea County, was a failure in the lower formations but plugged back to complete from pay around 6,100 ft. Completion potential was 513 bbl. of oil a day through ¾-in. choke.

Total depth was 14,153 ft. On elevation of 3,815 ft. it had the following markers: Pennsylvanian 10,500 ft., (?), Devonian 12,087 ft., Silurian 12,815 ft., McKee sand of the

Simpson at 13,910 ft.; and went into granite wash at 14,025 ft.

CANADA

New Mississippian Strike Reported in Williston Area

During the past week discoveries of oil or gas were chalked up at four wildcats in western Canadian provinces of Saskatchewan, Alberta and British Columbia. Two of those ventures found crude oil, while the other two were gas strikes. In addition, an indicated oil extension success was recorded in northeast British Columbia.

Two of the oil discoveries reported during the past 7 days were made in Saskatchewan—one finding light gravity oil, the other heavy gravity product. Both the strikes are in the southern sector of the province, but one is east near Redvers and the other is central, near Dollard.

The new light oil find was recorded by Socony-Vacuum Exploration Co. This venture, Socony-Woodley-Southern 1 St. Antoine, LSD 4, 24-6-32w1, is 13 miles west of the Manitoba border, 15 miles west-northwest of the Tilston oil find in southeast Manitoba and 38 miles due east of Shell's Midale oil discovery well.

Like a number of other oil discoveries in the Williston basin area, the St. Antoine well found its oil in the Mississippian formation. The Mission Canyon section of the productive formation was entered at 3,522 feet, and several drill-stem tests were run. Small amounts of free oil were recovered during those tests, and it is anticipated that a commerical well would be obtained following acidization of the formation. The well is being deepened to the Devonian, prior to running further production tests in the Mission Canyon.

Dollard area . . . The other Saskatchewan discovery was made at the Tide Water group's wildcat in the Dollard area, No. 5-21, LSD 5, 21-7-20w3, 6¾ miles north of Eastend area production and 61 miles southwest of Swift Current. This well found oil in indicated commercial volume during drill-stem test in the J2A member of the Jurassic, with interval 4,553-59 ft. giving up 2,025 ft. of gas-cut oil. Salt water came during test 10 ft. lower, production casing was run and crew was swabbing at rate 10 bbl. hourly at last report. Gravity of the oil is around 18°.

British Columbia . . . Like last week, British Columbia was again in the news, with another pair of encouraging wells. One of those was rated as a 1¼-mile oil extension and the other was a natural gas discovery. The oil find came at the Northern Foothills Agreement group's 2 Buick Creek exploratory driller, 1¼ miles west of the group's No. 1 well which discovered some oil and natural gas in the Cadomin last year. This follow-up driller flowed gas at rate 2,500,000 cu. ft. daily during test at 3,603 ft. and gave an 800-ft. recovery of 36°-gravity oil during a later test at bottom 3,611½ ft. Hole is being deepened.

The British Columbia natural gas discovery was made by J. B. White and Associates. This well, now a dual zone gas strike, flowed at rates estimated at 8,000,000 cu. ft. daily during tests in the Triassic formation. Casing was run and test was flowed from the perforated interval 4,640 to 4,693 ft., through a 5/8-in. choke.

This gasser, now capped, rated an approximate 1,000,000 cu. ft. per day gas flow from the Cadomin interval 4,224-30 ft. earlier this year. The well lies about 30 miles northwest of Fort St. John area gas wells and a few hundred feet west of mile post 111 on the Alaska Highway.

Alberta . . . Lone Alberta discovery during the period under review was made in the basal quartz section of the Lower Cretaceous, at an Imperial-owned wildcat in the Pembina Heights area. This northwest Alberta well had previously flowed gas in the Viking, at rates up to 3,150,000 cu. ft. daily, and is thus also a dual discovery well.

This venture, Imperial 10-21 Pembina Heights- LSD 10, 21-61-1w5, 50 miles northwest of Edmonton, flowed gas at 1,400,000 cu. ft. daily during test of the basal quartz interval 3,082-89 ft. Coring and testing is being continued.

Third Well for Pigeon Lake

A third well in the Pigeon Lake area near Edmonton, south of Bonnie Glen pool is being completed by Stanolind Oil & Gas Company. Stanolind et al 3 Pigeon Lake, flowed 735 bbl. of oil in 24 hours on 16/64-in. choke. The well is producing from the D-3 reef, which was topped at 6,602 ft. Total depth of the well is 7,043 ft. It is located in 14, 24-46-28w4 and its successful completion extends production one 40-acre location west of the discovery well. Two additional locations have been authorized, one west of the No. 3 well and one south of the discovery well.

EASTERN CANADA

Ontario. . . In Lambton County, Imperial Oil, drilling on the Ward Hollingsworth farm 2 miles northwest of Watford, has encountered oil and gas below 1,800 ft. depth. A burst of gas damaged drilling equipment, and later oil started to flow. Gas is being cemented off preparatory to deepening into the oil horizon. Location is east of the old Petrolia and Oil Springs shallow discoveries, but the oil is from a deeper horizon.

In Essex County a water well drilled by Gerald Smith Sundin on the Roy Harris property, near Leamington, encountered gas under considerable pressure at 50 ft. depth. Huron County council has authorized the warden and clerk to sign oil leases covering county lands. Imperial Oil is seeking drilling rights in Ashfield, Colborne and East Wawanosh townships.

Gaspe . . . In the Gaspe peninsula, Quebec, Bald Mountain No. 2 is drilling below 5,207 ft. after sidetracking lost tools. Continental Deep Test 1 is below 2,922 ft. and making gas from 2,794-99 ft. and still in the Grand Greve formation. Asphalt Base 1 is below 1,110 ft. in hard formation and making some gas. Tar Point 1 at 7,069 ft. is making gas and waiting casing and well head equipment. Quebec Oil 2 is below 5,393 ft.

ILLINOIS

June Report Includes Four New Pools

Four new oil pools and five extensions were completed in June, according to the Illinois State Geological Survey.

New discoveries were Wakefield North in Jasper County, Irvington North in Washington County, Kinmundy North in Marion County; Johnsonville Consolidated, Wayne County; Carlyle North, Clinton County; Clay City Consolidated, Jasper County, and Epworth Consolidated in White County.

Two pools gained a new pay zone during the month. Cypress sandstone was opened in Raleigh pool, Saline County, and Omaha South in Gallatin County.

MICHIGAN

Two Tests In Objective Pay Zone

Two wildcat oil tests were in objective pay horizons this week and their potentials appeared to offer two of the brightest spots for new, or continued, development found to date this year. One of these new wildcat wells was a Dundee extension producer to the southeast of Eden pool, Mason County, while the other one was a possible new Traverse oil discvoery in Ionia County, located about 4 miles south of Bloomer Traverse oil pool in Montcalm County—one of the best basinward Traverse pools in the state.

The Eden field extension, a semi-wildcat located about ½ mile southeast of the field, was drilled at the 1 Barothy et ux, NW NE NW 36-17n-16w, by Augie Busk & Carl Grime. Dundee top was logged at 2,287 ft. and hole was drilled to 2,290 ft. where well carried a hole full of oil natural within 24 hours. Well was acidized with about 250 gal. Unofficial reports indicated flowing production of 5 bbl. of oil an hour (or more) following treatment. Production will probably be restricted to about 90 bbl. a day.

The Ionia County wildcat, originally started with the Dundee as its objective, was drilled by McClure Oil Co. at the 1 Howk, SW SW NW 19-8n-5w, North Plains Township. A Traverse oil pay was logged at about 2,578 ft. in the Alpena Traverse section after top of lime was logged at 2,563 ft. Pay was believed to have been just scratched at 2,578 ft., present total depth. Hole filled 450 ft. with oil in 14 hours natural, with a good gas head showing and with no water in evidence. A long string of 5-in. casing was set on a perforated bottom joint with a packer at 2,564 ft. Operators plan to produce this well at its present depth natural for about 5 days and then acidize.

ARKANSAS

June Discovery Notes

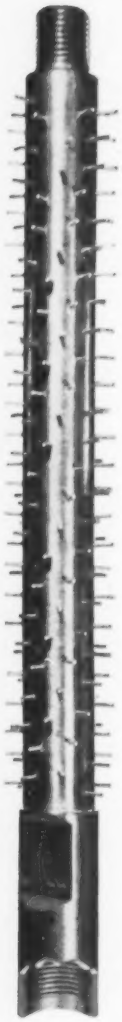
One new oil discovery, one new gas strike and two new oil pays were completed in June.

Leonard W. Phillips opened a new oil pool in the North Lisbon area of Union County at 1 Clemmie M. Bishop, C NE SE 25-16s-17w, 2½ miles northeast of Lisbon. The Smackover discovery was finaled pumping 109 bbl. of oil per day.

Washington County in northwest Arkansas has a new gas discovery at Arkansas-Western Gas Co. 1 Threlkeld, 5-14n-30w. The well was completed in January but not gaged until June. Gage was 1,500 M.c.f. of gas per day from the Sylamore, open flow. The well is ½ mile south of West Fork.

East El Dorado and Smackover field each has a new pay. Smackover Producing Co. 1 Paraffin-Ezzell, NE NW NW 24-17s-15w, is a Tokio sand oil discovery in the Rogers area of East El Dorado field. R. M. Crabtree has a Travis Peak oil discovery in the old Smackover field area at 2 Alphin, NW SE NW 11-16s-15w. The well flowed at the rate of 135 bbl. of oil per day through 14/64-in. tubing choke.

Paraffin Scratcher
by Baird . . .



This paraffin scratcher may be used as a service tool above a collapsible scraper, to break up the paraffin—or be built into the rod string below the paraffin zone and above the pump.

Available through your supply store in any rod and tubing size.

Baird Manufacturing Company

Box 380 Tulsa, Oklahoma

TEXAS

NORTH TEXAS

Fisher Wildcat Is Canyon Discovery

Claude E. Heard and Estill S. Heyser Jr. 2 Bert Rushing, 2½ miles northwest of Royston in northeast Fisher County, completed as a Canyon limestone discovery. Potential test was taken without acid, from perforations at 5,258-68 ft., gaging 144.85 bbl. of oil a day through 18/64-in. choke.

Southwest of Roby pool, Woodson Oil Co. 1 Knox in League 318, Gillespie County School Land Survey, recovered 300 ft. of muddy oil, plus 10 ft. of clean oil on drill-stem test from 3,618-38 ft. A second test from 3,663-73 ft. recovered 540 ft. of oil and 120 ft. of muddy oil.

Young County . . . Republic Natural Gas Co. 1 J. A. Gibbs flowed 537 bbl. of oil on completion test to open a new area 4 miles southwest of Olney. Production from casing perforations at 4,860-70 and 4,880-90 ft. Choke size on potential test was ¼-in.

Woodson Oil Co. 1 J. W. Bullock, 2 miles north of production, and 2 miles northeast of Newcastle, developed 2,070 ft. of gas and 30 ft. of oil and gas-cut mud on drill-stem test in the Caddo from 3,889-99 ft.

WEST TEXAS

Devonian Discovery Rates High Completion Potential

Luse & Ice 1-A Brictson, Devonian gas-distillate discovery in the Payton-Yates field of Ward County, made a calculated flowing potential of 105,000,000 cu. ft. of gas per day, plus 28.5 bbl. of 67.8° oil per 1,000,000 cu. ft. of gas. The potential was based on a 4-hour production test through open 2-in. tubing. Production was from open hole between 6,706-6,886 ft., total depth. Top of the Devonian was 6,705 ft., and minus 4,266 ft.

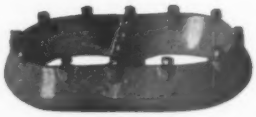
Andrews County . . . The Texas Co. 1-H Parker, deep project northwest of Andrews, has added Wolfcamp oil to the shallow Deep Rock, Means, and Fuhrman-Mascho trend running through the western half of Andrews County.

On a drill-stem test from 8,602-50 ft., oil reached the surface in 16 minutes, and through 1-in. opening gaged 48.82 bbl. the first hour and 55.34 bbl. the second hour of the test. Flowing pressure ranged from 1,890-2,400 psi. Second test from 8,562-8,602 ft. recovered some clean oil and oil-cut mud but did not flow. Top of the Wolfcamp was 8,420 ft. Location of the wildcat is 4 miles east of nearest Permian production, and about 7½ miles northwest of Continental Oil Co. 1 McCollum-Weibusch. The latter well was dry in the Ellenburger but completed as a Wolfcamp discovery with a high flowing potential.

Shell Oil Co. 1-B University, southwest offset to its 1-A University Ellenburger discovery northwest of the Midland Farms field, was flowing oil after acidizing in the Devonian. No gages or estimates were made on the flow. Perforations in the Devonian were from 10,552-80 and 10,728-40 ft.

Simpson prospect . . . In Northwest Midland County, U. S. Smelting Refining & Mining Co. 1 King found shows of oil in a Simpson sand, and after testing was drilling ahead looking for the Ellenburger.

INFERNO
Steam Stack Blowers



Offer These Features:

- Streamlined design to secure least resistance to flu gases and occupy a minimum of space.
- Stainless Steel Nozzle Jets.
- Malleable Iron Body—practically indestructible.

This stack blower makes it possible to secure up to 425% above rated boiler capacity using only 10% of the steam generated. Write for Bulletin 22-A.

THE INFERNO CO.
Box 1138A
115 RICOU St.
SHREVEPORT, LA.
INFERNO

SQUIER EVERITE
INSTRUMENT INK FEED
A Camel for Ink, 8 Days Without a Drink!

$2.75 each . . . lower in quantity. F.O.B. Dallas. When ordering, specify make of instrument. Write for bulletin.

Fits all makes of instrument pens. No special brackets or pen arm alteration—just attach with plastic bands. No clogging, no flooding—just the right amount of ink *only* when needed. Uses regular meter ink. Light-weight plastic. Dependable, trouble-free, inexpensive. Thousands in regular use.

SAVES TIME, MONEY, MANPOWER
See your jobber or order direct from:

JOHN P. SQUIER CO.
P. O. Box 6100 Dallas, Texas

Top of the Simpson sand was 13,070 ft. on elevation of 2,868 ft., said to be structurally lower than nearby dry holes. Drillstem test from 13,280-13,316 ft. recovered the water blanket slightly cut with gas and a trace of oil, 60 ft. of free oil, and 180 ft. of slightly oil and gas-cut mud.

Delaware basin test . . . Sun Oil Co. 1 J. B. Tubb, deep wildcat in northeast Loving County, was drilling below 12,019 ft. According to field sources, the hole would be carried to around 12,100 ft. before starting production tests up the hole. The only shows of oil so far reported were from 8,850-76 ft. in an unidentified section.

Yoakum County had prospects of addjtional Mississippian production at Skelly Oil Co. 1 Webb, 4 miles southwest of Plains. A drill-stem test from 11,200-11,227 ft. recovered the water blanket, 5 ft. of free oil and 60 ft. of oil-cut mud. Top of the Mississipian was picked at 11,190 ft., on samples, and minus 7,308 ft.

TEXAS PANHANDLE

Gulf Will Drill Deep Gray County Wildcat

Gulf Oil Corp. has staked location for a 10,000-ft. wildcat 2 miles east of Pampa, to determine whether or not the Anadarko basin extends west from Oklahoma into the Texas Panhandle oil fields.

The operation is 1 E. A. Shakelton, 67-3-I&GN Survey, 9 miles south and 8 miles west of Quinduno pool in Roberts County.

TEXAS GULF COAST

Wharton County Discovery Makes Marginulina Gasser

Potential tests at Sohio Petroleum Co.'s new Marginulina discovery well, 1 Houston, in the S. Castleman Survey, a mile southwest of Lane City, in Wharton County, indicated an open-flow productive capacity of 32,250,000 cu. ft. of dry gas daily. Shut-in pressure gages 1,682 psi.

Pay is from a casing-perforated interval of 5,428-35 ft. in hole drilled to 7,009 ft.

Location is south of the Cox field, producing from the second Frio sand.

Importance of Echo Area Boosted by New Discovery

New importance is attached to the Echo area, 4 miles north of Orange, in Orange County, following the completion by John W. Mecom, Houston independent operator, of a good oil-producer at his 1 First National, in the R. Ballew Survey.

The new well, a wildcat, located about a mile north of a small pumper completed last November by Magnolia Petroleum Co. as the discovery well of the Echo field, flowed at the rate of 241.56 bbl. of 38.6°-gravity oil per day on its potential test through 8/64-in. choke. Flowing pressure on the tubing gaged 1,500 psi. Gas-oil ratio was 858 cu. ft. per barrel.

Production is from a Frio sand, opposite which casing is perforated at 8,700-02 ft. Magnolia's discovery well, 1-G Lutcher-Moore, in the Benjamin Johnson Survey, produced from an interval at 8,722-27 ft. Its initial production was gaged at 22 bbl. of net 36.7°-gravity oil with 12 bbl. of water daily. Both wells were drilled to depths below 9,300 ft. before completing in the 8,700-ft. sand.

Since completion of the discovery well, Magnolia has drilled another 9,300-ft. test, 1-H Lutcher-Moore, located about a mile to the east, but this failed to find commercial production.

Sun Oil Co. now is preparing to test another wildcat in the general area. This prospective producer, 1 Linscomb, in the James Dyson Survey, is approximately 2 miles southwest of Magnolia's initial well. Pay to be tested is open through casing perforations at 9,202-26 ft. Hole was drilled to 9,412 ft. and has casing run to bottom.

SOUTHWEST TEXAS

Queen City Oil Production Opened at Hagist Ranch

Potentialities of the widespread Hagist Ranch field in Duval and McMullen counties, where an extensive gas production already has been proved in Wilcox sands, have been enhanced greatly by the opening of oil production in the shallower Queen City sand.

Discovery of Queen City production in this field has been made by Atlantic Refining Co. at its 12 Foster, located in the J. R. Foster Survey 200, Abstract 1643. The new well, on potential gage, flowed at the rate of 124.84 bbl. of 41.5°-gravity oil per day through 10/64-in. choke with 415-psi. flowing pressure on the tubing and gas-oil ratio of 600 cu. ft. per barrel.

The new producing zone is open through casing perforations at 5,194-5,212 ft. The field's Wilcox gas-producing reservoir is encountered at depths of 7,000 to 7,100 ft. Magnolia's well, with total depth of 5,329 ft., did not go to the Wilcox. The Wilcox has yielded a few oil wells, but is predominantly a gas reservoir.

"What do you know! It's oil....LANE-WELLS on the job."

Grinding and Hard-Chrome Plating of Diesel Engine Crankshafts—All Sizes

Complete facilities for grinding, plating, Magnafluxing, and electrically-controlled heat-treating. Largest hard-chrome plating plant in Mid-Continent area.

LANE PLATING WORKS 5322 Bonnie View Road
Box 9115 • FRanklin-1351
Experience • Quality • Precision DALLAS, TEXAS

LOUISIANA

NORTH LOUISIANA

Production Indicated At Claiborne Wildcat

Lyons, McCord & Logan will perforate for production in what is believed to be the Bodcaw sand of the Cotton Valley at 1 Robert Meadors, C W½ SW 8-22n-5w.

The wildcat is located 3½ miles northeast of Antioch in Claiborne Parish. Production has been indicated by a 30-minute drill-stem test at 7,770-75 ft. in a 5-ft. section of good oil sand. The test gave up an estimated 2,000 ft. of 39°-gravity oil and water cushion.

Two Discoveries Finaled In June in Region

One new oil discovery and one gas discovery were completed in June in northern parishes. A new pay discovery and field extention were also finaled during June.

A new Wilcox pool was opened in Grant Parish by Bates & Cornell at 1 Walter Fletcher, C SW NW SE 9-7n-4w, opening Aloha pool. The discovery well was finaled flowing 56 bbl. of oil per day through 6/64-in. choke.

Willow Chute field was opened in Bossier Parish by Pan American Production Co. at 1 L. V. Hunt, Section 5-19n-13w. The discovery well flowed 21.50 bbl. of condensate plus 2,976 M.c.f. of gas per day through 16/64-in. choke with flowing tubing pressure 1,990 psi. The pool is located about 1¾ miles south and east of Benton.

Springfield field had a new pay discovery at John B. Stephens, Jr., and A. O. Phillips 2 Mattie Grafton, 330 ft. from north and east lines NW Irregular Section 2-23n-11w, Webster Parish. The new pay is the Pettit.

Concordia Parish's Experance Point field was extended by Justiss-Mears Oil Co. and Barnett Serio 3 Hugh Junkin et al 1½ miles to the northwest. The discovery flowed 180 bbl. of oil per day through 9/64-in. choke from perforations at 6,219-23 ft. in the Campbell sand of the Wilcox. Another success has been recorded in this area since the extensioner's completion.

SOUTH LOUISIANA

New Discovery Confirmed

Recent discovery of shallow oil production 1½ miles north of the Golden Meadow field, Lafourche Parish, has been confirmed with the completion well, 3 Dominque Gisclair, Jr., flowed 45 bbl. of 26.4°-gravity oil per day through 14/64-in. choke from casing perforations at 2,591-2,600 ft. The discovery well, 2 Gisclair, produces from perforations at 2,595-99 ft.

Cameron Field Opens Second New Pay Zone

Stanolind Oil & Gas Co. has completed another new-pay discovery and extension well for Cameron field, in Cameron Parish, at its 1-B Henry. The new well, located in 28-14s-9w, ½ mile east of production, flowed 282 bbl. of 36°-gravity oil per day through 9/64-in. choke from sand, opposite which casing is perforated at 9,623-31 ft. Hole had been drilled to 11,500 ft. and casing run to 10,895 ft.

Nearest other well produces from sand at 9,140 ft. Stanolind's 1-B Davis, completed just prior to the drilling of 1-B Henry, also opened a new pay, at 10,800-10 ft. It is on the south side of the field.

Another Deeper Oil Zone Opened in Lake Long Field

The well-deepening program started earlier this year by Texas Gulf Producing Co. in its Lake Long field, in the marshes of Lafourche Parish, has resulted in the discovery of another producing zone.

The new pay has been opened by the company's 15 State, second old well to be deepened. The well, originally completed in 1941 in sand at 9,376-86 ft. with total depth of 10,179 ft., was deepened to 10,820 ft. New pay designated as the "H" sand, is at 10,640-50 ft., in which the well has been completed flowing 264 bbl. of 39°-gravity oil per day through 12/64-in. choke.

The first well to be deepened was 1 Octave Aucoin. Also originally completed in 1941 as a producer in sand at 10,218-28 ft., it was drilled to 12,142 ft., and completed last April in a new lower sand at 11,796-806 ft.

Lake Long field, discovered in 1937, and developed by Fohs Oil Co., was acquired by Texas Gulf Producing Co. several years ago.

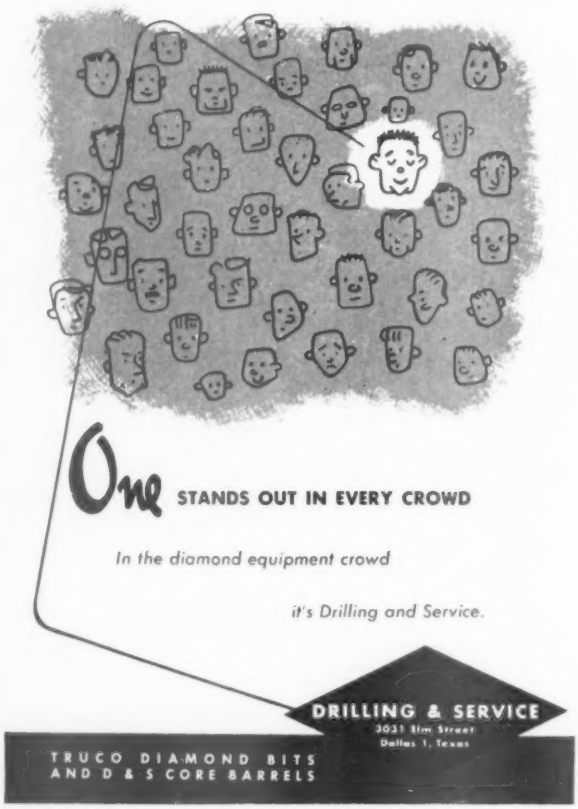
KENTUCKY

EASTERN KENTUCKY

In Magoffin County, 6-O-79, Monarc Utility Co. is drilling at 2,504 ft. at their 1 Whitaker wildcat. Operators topped Weir sand at 1,148 ft., Berea sand at 1,278, Devonian brown shale at 1,345 ft., Corniferous lime at 1,872 ft., the Big Six sand at 2,450 ft. Gas estimated in the amount of 150,000

THE OIL AND GAS JOURNAL

"Will someone please explain our retirement plan to this new night watchman?"


One STANDS OUT IN EVERY CROWD
In the diamond equipment crowd
it's Drilling and Service.
DRILLING & SERVICE
3031 Elm Street
Dallas 1, Texas
TRUCO DIAMOND BITS
AND D & S CORE BARRELS

cu. ft. daily was had in the Big Six to the present depth of 2,504 ft. Operators are currently drilling ahead.

In Martha pool of Northwestern Johnson County, Mullins & West have completed their 2 R. W. Wallin as a Weir sand producer at a total depth of 906 ft. After well was shot with 110 qt. of glycerin, well made 5 bbl. of oil daily.

In Big Sandy gas field and located on Sycamore Branch of Longfork in Pike County, Kentucky-West Virginia Gas Co. have completed a good shallow gas well. Productive Salt sand was topped at 1,310 ft. and penetrated to a total depth of 1,380 ft. Well gaged naturally 1,309,000 cu. ft. of gas daily with a rock pressure of 320 psi. in 20 hours.

CALIFORNIA

Wheeler Ridge Shallow Pays to Be Tested

Two shallow pays discovered by Richfield Oil Corp. in the development of the 10,000-ft. Eocene pool at Wheeler Ridge, Kern County, have received locations with these zones as the objectives.

In NE SE 29-11n-20w, Richfield will drill 176 K.C.L.-D. in search of a Vedder sand which was tested in drilling three Eocene wells in that section. On a formation test at 6,260-6,475 ft. in 76 K.C.L. last year, 44°-gravity crude was recovered at a daily rate of about 1,100 bbl. daily. Two later wells, 65 and 87 K.C.L., also found the sand potentially productive but like 76 K.C.L. were completed in the Eocene.

Standard Oil Co. of California has started 42 K.C.L.-33 in SW NE Section 28 as a test of the Olcese sand. In June Richfield 34 Gordon, two locations west, flowed at the daily rate of 1,374 bbl. on a formation test at 3,875-3,960 ft. Although the sand had proved productive in two earlier tests, Richfield at the time stated the 34 Gordon showing was the best yet in the Olcese.

Lost Hills Find Completed

Standard Oil Co. of California completed its 16 "Well" for a 177-bbl. pumper to give Lost Hills field, Kern County, a new deeper producing zone. The test topped the Carneros sand at 6,022 ft. and after drilling to 8,200 ft. was plugged back to 6,050 ft. for completion. Gravity of the crude was 32° A.P.I. The new discovery was drilled in NW SW 29-26s-21e, approximately in the middle of the 6-mile long anticlinal structure.

Paloma Test Nears Record

Ohio Oil Co.'s deep test in the Paloma field, 15 miles southwest of Bakersfield, was less than 1,000 ft. short of reaching the world's record depth of 20,521 ft. Hole is being made in the deep test, 72-4 K.C.L.A., at the rate of about 12 ft. daily. Aside from intermittent drilling with bits, diamond core-heads have been used for the past 7,000 ft.

Ventura Extension Under Way

Shell Oil Co. was drilling 801 Taylor as a southerly extension to Ventura Avenue field, its first test on a recently acquired block of acreage in the Devils Canyon area. Location of the extension test is 29-3n-23w.

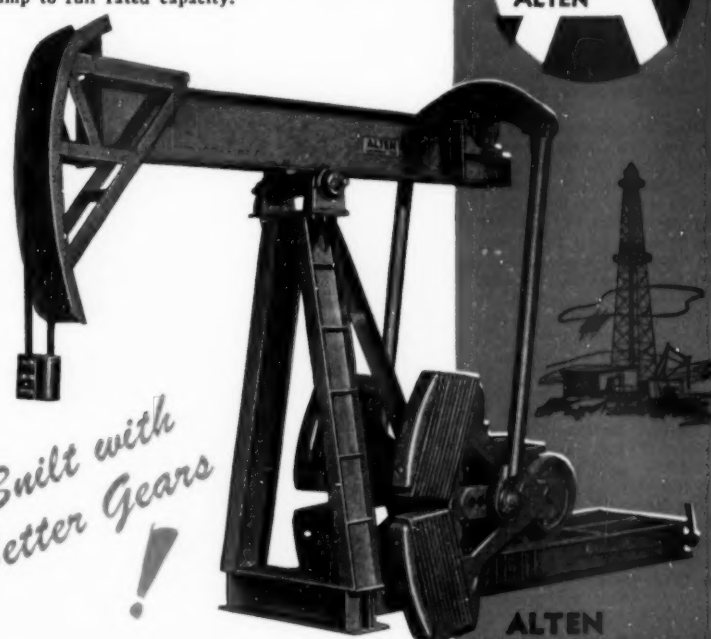
The operator continued testing 378 Taylor at 15,436 ft., bottomed in what is believed to be the field's new D-8 zone. In the eastern

ALTEN Pre-Tested PUMPING UNITS

Give Positive Performance

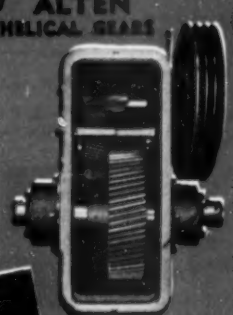
Every Alten unit is ready for instant, uninterrupted operation the moment it is delivered. Thorough factory pre-testing stops breakdowns before they occur. You can be sure every Alten will pump to full rated capacity.

ALTEN



Built with Better Gears!

ALTEN HELICAL GEARS



Ordinary gears cannot provide the continuous year in, year out performance you get from these Alten helical gears. First of all they are hob cut so that each tooth has a perfect profile that is permanent. No unflexing V centers to induce uneven wear; all stress is evenly distributed throughout the entire surface . . . then these gears are SUPER-FLAME hardened to produce hardest surfaces obtainable. Without hesitation—ask for Alten the next time you buy a pumping unit. You'll be glad you did.

At Your Supply Store

SALES OFFICES
Lancaster, Ohio
Olney, Illinois
Hutchinson, Kansas
Duncan, Okla.
Abilene, Texas
Houston, Texas
Casper, Wyoming
Edmonton, Alberta, Canada

ALTEN
Foundry & Machine Works, Inc.
LANCASTER, OHIO

WAREHOUSES
Lancaster, Ohio
Wichita Falls, Texas
Houston, Texas
Casper, Wyoming
Edmonton, Alberta, Canada

EXPORT OFFICE
New York City

part of the field Lloyd Corp., Ltd. 3 William Sexton was drilling below 15,461 ft. in search of the new pay.

Third Test for Torrey Canyon

Union Oil Co. has staked another wildcat on its Rancho Simi fee-property in Ventura County. The new test will be 21 Simi, in 18-3n-18w or about 2½ miles southwest of the Torrey Canyon field. Its 20 Simi is to be drilled in Section 8. In Section 6, ½ mile northwest of Torrey Canyon 10,000-ft. production, The Texas Co. was preparing to start 2 Hunter.

APPALACHIAN AREA

OHIO

Preston Oil Co. 6 Heffelfinger, 3rd Qr., New Castle Township, Coshocton County, an outside location, made a good showing of oil and 250,000 cu. ft. of gas natural which increased to 185 bbl. in 24 hours with 500,000 cu. ft. of gas after fracturing Clinton sand, reported at 3,328-3,392 ft.

A new area in Fallsburg Township, Licking County, north of abandoned production, has been opened by the Dun-Mar Oil & Gas Co. with a producer on W. E. McDonald, Section 20. Clinton at 2,982-3,306 ft. was fractured and made 50 bbl. in the first 24 hours.

Three completions were reported in Jackson Township, Knox County: National Gas & Oil Co. 3 Jewell, Section 25, made 144 bbl.; Mid East Oil Co. 4 G. Dolmasso, Section 24, made 251 bbl.; and Murphy Oil Co. 3 Spang, Section 11, made 70 bbl. during the first 24 hours after fracturing.

A quarter-mile extension to New Castle pool with an increase in sand thickness was found by the Foraker Drilling Co. on 1 C. O. Giffen, Section 22, New Castle Township, Coshocton County. Clinton at 3,315-3,364 ft. was fractured below 3,345 ft. and responded with 150 bbl. in 24 hours.

The Mutual Oil and Gas Co. brought in a 242-bbl. producer along the south edge of Mt. Zion pool in Jackson Township, Knox County. Clinton sand, logged at 2,820-2,861 ft. made a good showing of oil natural, and was fractured.

The Status Development Co. brought in a gasser south of East Sparta in Section 26, Pike Township, Stark County. Clinton at 4,649-4,714 ft. gaged 2,200,000 cu. ft., and was tubed natural.

WILDCAT COMPLETIONS

SOUTHWEST TEXAS

Atascosa County: Carter & Carter 1 Munoz, H. H. Wood Sur. 1508, A-823. Dry. TD 4,081 ft.

A. S. Mowinckle 1 Shaw, Mason Turner Sur. 1116, A-1067. Dry. TD 2,275 ft.

Newman Brothers Drilling Co. et al 1 Jendrush, A. Houston Sur. 132, A-858. Dry. TD 3,500 ft.

Harris S. Stahl 1 Cousins, Peter McGreal Sur. 1297, A-624. Dry. TD 1,883 ft.

Duval County: Atlantic Refining Co. 12 Foster, J. R. Foster Sur. 200, A-1643. IP 124.84 BOPD, 10/64-in., 41.5°, Queen City 5,194,5,212 ft. (casing perforations). TD 5,329 ft. (New pay in Hagist Ranch field.)

Gonzales County: O. Neathery, Jr., and Rodney De Lange, A. B. Dillard Sur. IPP 57.50 BOPD, 22°, casing perforations 1,980-86 ft. TD 2,307 ft. (Extends Stulting field.)

Jim Hogg County: Killam & Hurd 3 Holbein, Las Animas Grant, A-244. Dry. TD 3,000 ft.

Kleberg County: Chicago Corp. 1 Kaufer, Theodore F. Koch Subd. 1, Lot 34, Blk. 23. Dry. TD 7,022 ft.

LaSalle County: Newman Brothers Drilling Co. 1 Newman, J. Poitevent Sur. 36, A-1353. Dry. TD 2,300 ft.

Milam County: Claude V. Brown 1 Gibson heirs, Monroe Edwards Sur. Shutdown. TD 2,218 ft.

Dry Holes, Inc., 2 Fuller et al, Francisco de los Rios Sur. Dry. TD 840 ft.

Nueces County: Austral Oil Exploration Co., Inc., and Phillips Petroleum Co. 1 State, Tract 19, Corpus Christi Bay. Dry. TD 9,300 ft.

Orlee Oil Co. and Ed W. Dawson 1 Luby, Mary Luby Petronilla Subd. Dry. TD 5,107 ft.

Starr County: L. M. Lockhart 2 Lockhart & Co., Sur. 934. Shutdown. TD 2,525 ft.

Travis County: Frank Levy et al 1 Erlich, Peter V. Harrison Sur. Dry. TD 1,050 ft.

Willacy County: The Texas Co. 1 Southern, Gulf Coast Irrigation Subd. Dry. TD 10,517 ft.

TEXAS GULF COAST

Brazoria County: Pan American Production Co. 1 Houston Farms, BBB&C Sur., A-445. Dry. TD 7,225 ft.

Calhoun County: Brazos Oil & Gas Co. 1-13 State, Juan Cana Sur., A-5, in Powderhorn Lake. Dry. TD 10,537 ft.

The Texas Co. 1 State, Tract 24, Lavaca Bay. Dry. TD 8,886 ft.

Colorado County: Southern Minerals Corp. 1 Kallina, I&GN Sur. 15, A-326. Dry. TD 9,214 ft.

DeWitt County: Kirkwood & Co. 1 E. L. Boldt est., P. C. Ragsdale Sur., A-414. IP 15,000 M.c.f. daily with 459 BCPD, open flow, 47.2°, Wilcox 7,422-27 ft. (casing perforations). TD 7,615 ft. (Extends Sally field).

Fayette County: C. G. Glasscock 1 Richers, W. F. Hamilton Lge., A-2. Dry. TD 2,507 ft.

Fort Bend County: Hill & Hill et al 1-A Sugarland Industries, John Foster 2½ Lge., A-26. Dry. TD 8,625 ft.

Curtis Hankamer 1 Luscher et al, T. Habermacher, A-191. Dry. TD 8,023 ft.

Galveston County: John W. Mecon 1-A University of Texas, H. B. Littlefield Sur., A-143. Dry. TD 10,533 ft.

Sun Oil Co. 1 Craig, Sarah White Sur., A-207 (Greens Lake area). Dry. TD 12,400 ft.

Goliad County: 2ND M. E. Andrews, Ltd., and Dallas Husky 1 Wilson, Noah G. Stebbins Sur. IP 28,000 M.c.f. daily, open flow, casing perforations 3,065-75 ft. TD 3,080 ft.

Jackson County: Casa Grande Oil Co. et al 1 Stewart, James Kerr Sur., A-39. Dry. TD 5,315 ft.

Karnes County: Geochemical Surveys 1 Newman, V. Zepeda Sur., A-13. Dry. TD 7,462 ft.

Jefferson County: Sun Oil Co. 1-B White, J. T. White Sur. 328, A-549. Dry. TD 12,000 ft.

Liberty County: General Crude Oil Co. 1 Sibley et al, S. Strong Sur., A-110. Dry. TD 9,003 ft.

Live Oak County: V. G. Schimmel 3 Lennox, Wesley Sellman Sur. 60. Dry. TD 4,100 ft.

Matagorda County: Brewster-Bartle Drilling Co., Inc., 1 Huebner, James Silvey Sur., A-382. Dry. TD 11,778 ft.

Skelly Oil Co. 1 Savage, Maria Cummins Sur., A-22. IP 160 BOPD, ⅛-in., 33.6°, Frio 8,476½-79½ ft. (casing perforations). TD 11,799 ft.(New field).

The Texas Co. 1 Hiltpold, I&GN Sur., A-331. Dry. TD 9,500 ft.

Newton County: San Jacinto Petroleum Corp. 1 Hankamer et al, Nancy Guthrie Sur., A-127. Dry. TD 9,834 ft.

Warren Petroleum Corp. and R. E. Smith 1 Quinn, H&TC Sur., A-1083. Shut down 7,617 ft.

Orange County: Cron & Gracey Corp. 2 Stark, J. A. Richardson Sur. 16, A-347. Dry. TD 8,917 ft.

Victoria County: Fidelity Oil & Royalty Co. 1 Gerloff et al, S. de Leon Sur., A-76. Dry. TD 5,932 ft.

Arnold O. Morgan 1-B Welder, SA&MG Sur. 326. IP 205.2 BOPD, 10/64-in., 32.8°, Wilcox 8,202-12 ft. (Casing perforations). TD 8,355 ft. (New field.)

Wharton County: Sohio Petroleum Co. 1 Houston, S. Castleman Sur., A-12. IP 32,250 M.c.f. daily, open flow, Marginulina 5,428-35 ft. (casing perforations). TD 7,009 ft. (New field.)

EAST TEXAS

Cherogee County: Frank and George Frankel 1 Doris Carter, E. Vickery Sur., A-869. Dry. TD 9,574 ft., elev. 393 ft., Paluxy 7,015 ft., Glen Rose 7,345 ft.

Houston County: Jack Frost 1 Earle P. Adams, S. C. Collison Sur., A-241. Dry. TD 6,100 ft.

Limestone County: Trans-Tex Transmission Co. 1 G. C. Lown, W. M. Williams Sur. dry. TD 5,720 ft.

Red River County: F. M. McClanahan 1 Wooley & Nelson, J. Bowerman Sur. Dry. TD 1,120 ft.

Rusk County: Devon-Leduc Oil Co. 1 W. H. Farris Estate, William Elliott Sur., A-9. Dry. TD 7,030 ft.

WEST CENTRAL TEXAS

Brown County: Deep Rock Oil Corp. 1-B Moore, W. B. Smith Sur. 155. Dry. TD 3,752 ft., elev. 1,578 ft., Ellenburger 3,234 ft.

Coleman County: Amberson Producing Co. 1 H. W. Schulze, Gossett Sur. 218. Dry. TD 1,405 ft.

E. A. Gillespie 1 R. L. Allen, 148-1-GH&H. Dry. TD 2,920 ft.

Hovgard & Fitzgerald 1 J. P. Norris Estate, Sec. 3, BS&F. Dry. TD 3,789 ft.

Mayhew Machine Co. 1 Vernon Helms, MEP&P Sur. Dry. TD 2,184 ft.

Fisher County: Skelly Oil Co. 1 Agnes Swann, R. S. Spiers Sur. 283. Dry. TD 6,490 ft., elev. 1,875 ft., Ellenburger 5,446 ft.

West Central Drilling Co. 1 D. A. Ulmer, Sec. 201, H&TC. IP 241 BOPD, 5/16-in., pay 4,527-33 ft. TD 4,545 ft.

Haskell County: Thos. D. Humphrey & Sons 1-C Collins, H. Fisher Sur., A-133. Dry. TD 2,775 ft.

Woodson Oil Co. 1-B Coody, J. P. Rozier Sur. Dry. TD 5,009 ft.

Jones County: Jones & Stasney and Rock Hill Oil Co. 1 W. J. Bryan, Sec. 40, BBB&C. Dry. TD 4,926 ft.

Neely & Neely 1 R. B. Moss, Sec. 16, Asylum Lands Sur. Dry. TD 2,760 ft.

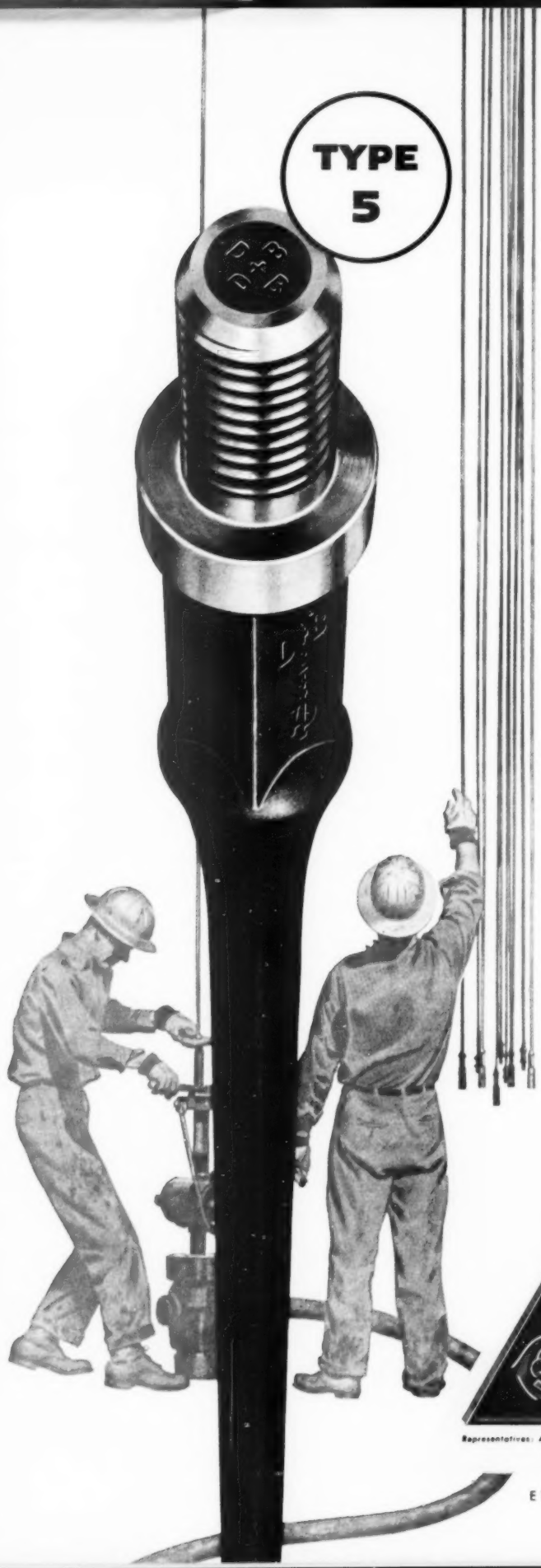
Nolan County: General Crude Oil Co. 1 E. C. Bennett, 238-64-H&TC. Dry. TD 5,320 ft.

Jones & Stasney 1 G. W. Cochran, 112-1A-H&TC. IP 265 BOPD, 16/64-in., 37°, perforated 4,015-23 ft. TD 6,676 ft.

T. A. Kirk 1 J. W. Lynch, Daniel Magee Sur. 299. IP 149 BOPD, ½-in. 44°, Ellenburger 6,065 ft. TD 6,117 ft.

Palo Pinto County: H & J Drilling Co. 1 W. H. Belding, J. Reasoner Sur., A-382. Dry. TD 2,552 ft.

Stonewall County: Edgar Davis Drilling Co. 2 Arthur Brinkley, 4-9-AB&M Sur. Dry. TD 6,088 ft., elev. 1,696 ft., Caddo 6,038 ft.



Balanced to give *better* performance

The balanced physical properties and strain-free internal structure of D + B Type 5 alloy steel sucker rods are the result of scientific heat treating. D + B's full-length, electronically-controlled heat treating furnace is the finest of its kind in the world. It is one of the few in which *true* normalizing is done.

Accurate time and temperature controls are producing sucker rods that combine greater strength, ductility and impact resistance.

Each heat of alloy steel is forged, normalized and drawn to specifications determined by D + B research engineers, based on 35 years of experience in making the industry's finest sucker rods.

Call your D + B or CONTINENTAL store for service anywhere . . . any time. Sales and service facilities are available in virtually all major producing areas.

YOU CAN'T BUY A BETTER SUCKER ROD

TYPE 5 SUCKER RODS

Made of nickel molybdenum alloy steel in ⅝" to 1" sizes. Type 5 Sucker Rods are recommended for heavy duty pumping in medium corrosive wells. Pony rods are available in all diameters and in lengths from 2' to 12', inclusive.

D+B DIVISION
EMSCO MANUFACTURING COMPANY
Garland, Texas · LOS ANGELES, CALIF. · Houston, Texas

D+B

- COUPLINGS
- DEEP WELL PUMPS
- SUCKER RODS

CONTINENTAL

"SERVING THE OIL AND GAS INDUSTRIES"

Export Div.: The Continental Supply Co., Inc., 30 Rockefeller Plaza, New York, N. Y.
The Continental Supply Company, Limited, 216 Lancaster Bldg., Calgary, Alberta
Representatives: Argentina, Bolivia, Brazil, Chile, Colombia, England, Ecuador, Peru, Trinidad, Uruguay, Venezuela

E 138-F

Dependable...for the life of your well

You find Emsco pumping units in hard-to-get-to places—perched on mountain tops . . . marooned in swamps . . . isolated in deserts—wherever the operator needs dependable . . . day-after-day, year 'round performance.

In addition to being rugged, dependable performers, Emsco pumping units give you these operating advantages:

1 ***One-man, Ground-level Counterbalancing.*** One man, working at ground level, can safely, quickly and accurately adjust Emsco' patented rotary counterweights.

2 ***Auxiliary Counterweights.*** Emsco's wing-type counterweights are designed so auxiliary weights may be added as needed to meet counterbalance requirements resulting from changing conditions in the well.

3 ***Hydraulic removal of Wrist Pins.*** The wrist pin assembly is designed to be unseated by the hydraulic pressure of a grease gun.

Emsco pumping units also provide: Controlled splash lubrication of all gears and gear box shaft bearings. Rigid, one-piece gear box—there is no split across the bearing bores to cause possible bearing distortion. Roller bearings throughout. Four-legged, derrick-type samson post, with widely-spaced, rigidly-braced legs.

Call CONTINENTAL for details about these dependable units. There's a size to meet every pumping requirement.

EMSCO

EMSCO MANUFACTURING COMPANY

Houston, Tex. LOS ANGELES, CALIF. Garland, Tex.

CONTINENTAL

"SERVING THE OIL AND GAS INDUSTRIES"

THE CONTINENTAL SUPPLY COMPANY, General Offices: DALLAS, TEXAS

Export Div., The Continental Supply Co., Inc., 30 Rockefeller Plaza, New York, N. Y.

The Continental Supply Company, Limited, 216 Lancaster Bldg., Calgary, Alberta

Representatives: Argentina, Bolivia, Brazil, Chile, Colombia, England, Ecuador, Peru, Trinidad, Uruguay, Venezuela

E 138-B

WILDCAT COMPLETIONS

Taylor County: E. E. Fletcher 1 A. E. Hohertz, 29-121-Guadalupe CSL. Dry. TD 5,127 ft.

Lester & Duffield 1 Wendell Foreman, Sec. 30, Blind Asylum Lands Sur. IP 8,100 M.f.g., 48 bbl. 72° distillate, Strawn pay 3,954 ft. TD 4,019 ft.

S. C. Herring Drilling Co. 1 A. V. Landers, A. A. Woodring Sur. 440. IP 80 BOPD, ¼-in., 40°, pay 4,370-80 ft. TD 4,700 ft.

Howsley & Jacobs and J. S. Swearinger 1 S. M. Casady, 25-18-T&P. IP 127 BOPD, 15/64-in., 41°, pay 4,656 ft. TD 48,705 ft.

Mid-Continent Petroleum Corp. 1 Florence Spencer, J. R. Munson Sur. 412. Dry. TD 4,516 ft.

Roark, Hooker & Roark 1 Harris Davenport, Blk. 396, I. S. Johnson Sur. Dry. TD 4,275 ft.

Roark, Hooker & Roark 1 J. C. Hammer, 23-19-T&P. IP 55 BOPD, 8/64-in., pay 5,486-92 ft. TD 5,512 ft.

Throckmorton County: A. G. Hill et al 1 H. F. Smith, Sec. 226, BBB&C. Dry. TD 4,519 ft.

Noel Pautsky 1 O. W. Burgess, Sec. 3045, TE&L Sur. IP 180 BOPD, ¼-in., pay 4,268 ft. TD 4,282 ft.

Woodson Oil Co. 1 Gober-Edwards, Sec. 3, Day Land & Cattle Sur. IP 105 BOPD, 8/64-in., 41°, pay 4,125 ft. TD 4,892 ft.

NORTH TEXAS

Archer County: Bolin Oil Co. 1 C. H. Williams, SPRR Sur. 2, A-1258. Dry. TD 5,200 ft.

L. T. Burns 2 G. U. Baker, TE&L Sur. 1897, A-577. Dry. TD 4,115 ft.

R. B. Clark 1 Mrs. L. C. Garvey, Blk. 72, Jefferson CSL. Dry. TD 1,250 ft.

R. W. Darden 1 Jones, Blk. 4, M. Galan Sur., A-137. Dry. TD 903 ft.

Fain & McGaha 1 J. L. Prideaux, Wm. Henry Sur. Dry. TD 3,938 ft.

Tom B. Medders 1-B Decker, Sec. 6, SPRR. Dry. TD 4,930 ft.

Novi Equipment Co. 2 John Purcell, Blk. 74, Jefferson CSL. Dry. TD 1,143 ft.

Clay County: L. T. Burns 1 Roscoe Scott, TE&L Sur. 3285, A-646. Dry. TD 6,713 ft.

Marvin L. McCullough 1 J. D. Avis, G. S. Ross Sur., A-396. Dry. TD 2,514 ft.

Grayson County: Youngblood & Foree 1 Harvel, J. Crutchberry Sur., A-254. Dry. TD 5,205 ft.

Russell Maguire 1 W. R. Hill, BB&C Sur., A-106. Dry. TD 3,705 ft.

Jack County: The Texas Co. 2 H. R. Bloodworth, Wm. McDonald Sur., A-380. IPP 81.6 BOPD, 39°, pay 3,786 ft. TD 3,814 ft.

Upham Gas Co. 1 F. H. Keyser, L. B. Watkins Sur., A-1502. TD 5,221 ft.

Montague County: Allied Material Corp. 1 J. J. Lowery, Blk. 51, C. C. Hornsby Sur. Dry. TD 5,926 ft., elev. 880 ft., Caddo 5,567 ft.

Benbrook Oil Corp. 1-B Hinds-Clark, 43-A247-ETRR. Dry. TD 6,041 ft.

Fryer & Hanson Drilling Co. 1 K. Sheen, C. C. Milne Sur., A-485. Dry. TD 5,989 ft.

Lion Oil Co. 1 Lasseter, MEP&P Sur. 15, A-519. IP 249 BOPD, 16/64-in., 41°, conglomerate pay 5,852-60 ft. TD 5,914 ft.

Wichita County: Morgan Bros. 1 J. & J. Waggoner, H. George Sur., A-454. Dry. TD 1,478 ft.

The Texas Co. 1 Minnie Pace, Lot 198, Waggoner Subd. Dry. TD 3,006 ft.

Wilbarger County: Dublin-Kiel 1-D Waggoner Estate, 48-3-H&TC. Dry. TD 2,504 ft.

Young County: Darden & Barnett 1 J. R. Barnett, Blk. 177, TE&L Sur., A-424. Dry. TD 1,249 ft.

S. D. Johnson 1 V. Holcomb, R. M. J. Fisher Sur., A-95. Dry. TD 3,772 ft.

Woodson Oil Co. 1 J. H. Hausler, TE&L Sur. 412. IP 252 BOUD, 10/64-in., 42°, Mississippian 4,886 ft. TD 4,926 ft.

WEST TEXAS

Coke County: Honolulu Oil Corp. 1 C. N. Webb, Sec. 127, E. Thomas Sur. Dry. TD 6,050 ft.

Liedtke & Liedtke 1-68 John Abe March, 68-16-H&TC. Dry. TD 7,010 ft.

Crockett County: George Barnes 1 J. W. Childress, 82-GH-GC&SF. Dry. TD 1,503 ft.

M C M Oil Co. 1 University, 2-50-State T30058 Sur. IP 70 BOPD, 10/64-in., 35°, pay 2,186 ft. TD 2,525 ft.

M C M 1 State Lease M-32868, 11-47-University, IP 64 BOPD, ⅛-in., 35°, pay 2,200 ft. TD 2,355 ft.

M C M 1-D University, 10-47-University. IP 64 BOPD, 14/64-in., pay 2,110 ft. TD 2,500 ft.

Dawson County: McClure Hopkins 1 J. F. Fowler, 111-M-EL&RR. IPP 69 BOPD, 33°, pay 4,940 ft. TD 8,575 ft., PB 4,995 ft.

Dawson County: McClure Hopkins 1 J. F. Fowler, 111-M-EL&RR. IPP 69 BOPD, 33°, pay 4,940 ft. TD 8,575 ft., PB 4,995 ft.

Ector County: Cities Production Corp. 1-C Cross, 44-43-T&P. IPP 161 BOPD, 33°, top pay 8,230 ft. TD 12,015 ft., PB 8,400 ft.

Gaines County: S. C. Ringling and J. Z. Kimberlin 1 Lynn Butler, 29-A19-PSL. Dry. TD 5,250 ft.

Garza County: George J. Crees 1 L. G. Thuett, 1314-A704-H&OB. Dry. TD 3,710 ft.

Howard County: Diamond Drilling Co. 1-B Minnie Smith, 4-31-T2N-T&P. Dry. TD 7,770 ft.

Lubbock County: Anderson-Prichard Oil Corp. 1 Nancy Fortner, 73-S-GC&SF. Dry. TD 10,462 ft.

Pecos County: Maxwell Burkett 1 Marsh Lea, 19-8-H&GN. Dry. TD 2,859 ft.

H. L. Hunt 1 Eaton, 27-3-H&TC. IP 3,527 M.f.g., and 65 bbl. 61° distillate per day, Devonian pay 5,368 ft. TD 5,710 ft.

Runnels County: Gulf Oil Corp. 5 H. C. Stehle, L. Forsythe Sur. 450. Dry. TD 5,400 ft.

S. C. Herring Drilling Co. 1 Hale, I. P. Wallace Sur. 139. IP 48 BOPD, ¼-in., 40°, pay 3,805-14 ft. TD 4,048 ft.

Hickok & Reynolds, Inc., 1 Belle Sayler, Sec. 44½, A. J. Roper Sur. Dry. TD 4,635 ft.

Schleicher County: Roeco Oil Co. 1 R. M. Thomson, 70-A-HE&WT. Dry. TD 7,439 ft., elev. 2,401 ft., Ellenburger 7,185 ft.

Terrell County: Humble Oil & Refining Co. 1 Blackstone, 58-B2-CCSD&RGNG. IP 310,000 cu. ft. gas, pay 3,405-35 ft. TD 12,303 ft., PB 3,751 ft.

Corrected locations . . . C. L. Norsworthy, Jr. 1 Virgil J. Powell, 21-A-AB&M Sur., and Plymouth Oil Co. 2 A. N. Thomerson, 65-H-GH&SA Sur., last week were carried under Reagan County completions. Both wells are in Schleicher County. Western Drilling Co., Inc., and Tobe Foster 1-B Dixon, 608-D, J. H. Gibson Sur., Yoakum County, was carried in Winkler County last week.

SOUTHEAST NEW MEXICO

Lea County: Gordon M. Cone 1-B Sinclair-Taylor, 25-18s-38e. Dry. TD 2,930 ft.

ILLINOIS

Bond County: B. A. Baker 1 Baum, SE NE NE 33-4n-2w. Dry. TD 1,346 ft.

Clinton County: E. A. Obering 1 Vogel, NW NW NE 33-3n-2w. Dry. TD 1,235 ft.

The Texas Co. 1 Brown, SW NW NW 8-1n-1w. Dry. TD 1,759 ft.

Effingham County: Sun Oil Co. 1 Blunt, SW NW SW 33-7n-7e. Dry. TD 2,811 ft.

Franklin County: Alfred Skaff 1 Anna Miller, W½ SW NE 13-5s-4e. Dry. TD 3,371 ft.

Walter Duncan 1 Abshire, NE SW NE 11-7s-4e. Dry. TD 3,360 ft.

Macoupin County: S. B. Schenk 1 Scroggins, SW NE SW 35-7n-6w. Dry. TD 625 ft.

Wayne County: Gulf Refining Co. 1 Laura Massie, NE NE NW 23-1n-9e. Dry. TD 3,381 ft.

White County: Herndon Drilling Co. 1 Land, SW SE SE 25-5s-9e. IPP 45 BOPD, Rosiclare 3,109-15 ft., TD 3,115 ft. Extension to Epworth Consolidated pool.

INDIANA

Daviess County: Snyder & Vickers 1 Lemonds, NW NE SE 11-5n-6w. Dry. TD 766 ft.

Dubois County: George Hobbs-F. M. Ashby 1 Schmeltekof, NE NE NW 25-3s-6w. Dry. TD 1,256 ft.

Knox County: H. L. Cokes 1 Oxeman-Griffith, NE NE NE 9-1n-10w. Dry. TD 1,945 ft.

Posey County: V. R. Gallagher 2 Kiefer, SE SW NE 35-4s-13w. Dry. TD 2,183 ft.

Gallagher 1 Hunter, SE NE SW 35-4s-13w. Dry. TD 2,214 ft.

Carter Oil Co. 1 Dixon, SE NW NW 7-8s-13w. Dry. TD 2,751 ft.

Spencer County: Basin Drilling Co. and S. Yunker 1 Shipp, NW NW NE 7-4s-4w. Dry. TD 1,073 ft.

O. Greer 1 Cooper, NE NW SE 21-4s-5w. Dry. TD 1,030 ft.

Oil Electronics 1 Snyder-Planes, SW NW NE 7-7s-6w. IPP 15 BOPD, Aux Vases lime 1,534-39 ft., TD 1,541 ft. Discovery of Lake Mills pool.

J. M. Haynes 1 Trobaugh, SE NE SW 22-7s-6w. Dry. TD 1,577 ft.

Vigo County: Carl Wright 1 Nichols, NE NE SE 9-12n-9w. Dry. TD 1,721 ft.

Lowry-Markey-Turner 1 Sutton, SE SE SE 10-11n-8w. Dry. TD 1,704 ft.

KENTUCKY

Daviess County: Shelly McIntosh-J. Tuttle 1 Cravens, SW NE NW 21-N-2E. IPP 30 BOPD, Hardinsburg 1,403-09 ft., TD 1,421 ft. Extension to Glenville pool.

Hancock County: L. E. Owen 1 Brown, SE SE SE 6-P-3E. Dry. TD 781 ft.

J. C. Ellis 1 Boling, SE NE NE 3-O-3E. Dry. 391 ft.

MICHIGAN

Allegan County: Michigan Oil & Gas Drilling Co. 1 Bailey, SW NW NE 7-4n-12w. Dry. TD 1,828 ft. in Traverse.

Allegan County: Charles W. Cook 1 Hower, SW NW NE 10-3n-13w. Dry. TD 1,742 ft. in Traverse.

Antrim County: Sun Oil Co. 2 Ward Land Co., SW SW SW 25-30n-5w. Dry. TD 1,660 ft. in Traverse.

Mecosta County: Walter E. Anderson 1 Dobben & Carpenter, SE SE SE 22-15n-7w. Dry in Marshall.

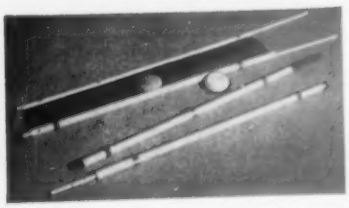
WEST VIRGINIA

Randolph County, Roaring Creek district: Fox & Thimble et al 1 King & Casad, elev. 2,486 ft., 157,000 cu. ft. gas, after shot in Fifth sand and lime at 2,163, 2,208, 2,385 and 2,462 ft. TD 4,260 ft.

MARYLAND

Garrett County: Eberly & Snee 1 McCul-

NEW! KRAFTBILT
ALL-PLASTIC, SNAP-ON
MAP STICKS



No more wood, hammers, tacks! Kraftbilt all-plastic Map Sticks are **stronger, easier** to handle. You snap the map to the stick with plastic clips, roll, secure with larger clips . . . map is ready to be filed! One man can do the job easily!

AND KRAFTBILT **MAP WEIGHTS**
Shot-filled horsehide bags—just toss 'em on! They hug your map to the board like an extra pair of hands! Say goodbye to maps with thumb tack perforations and gummy edges left by masking tape. These weights will hold your maps better! Send for Bulletin 352-A.

ROSS-MARTIN COMPANY, Box 800-T
423 E. 4th, **Tulsa, Okla.,** Phone 3-6116

Write or Wire
for Monthly Stock Lists

- **VALVES**
- **PRESSURE TUBING**
- **STEEL**

Peerless Supply Co., Inc.
L. D. 75 & 76 P. O. Drawer 36-A
Shreveport, La.

Get the FACTS!

For good living near the job, Schult offers BIG VALUE. For information, write now. Dept. 6507

SCHULT CORP.
ELKHART, INDIANA

WILDCAT COMPLETIONS

lough Heirs, 5,000,000 cu. ft. gas, rock pressure 2,960 psi. in 12 hours. Onondaga 6,954 ft., chert 6,971 ft., second section Onondaga 6,990 ft., Oriskany sand 7,186 ft., gas 7,191-7,237 ft. TD 7,238 ft.

FLORIDA

Santa Rosa County: D. E. Hughes 1 State, C NE NW 31-5n-26w. Dry. TD 6,380 ft. Elev. 162 ft., Chalk 3,308 ft., Eutaw 3,841 ft., marine Tuscaloosa 5,534 ft., lower Tuscaloosa 5,800 ft., lower Cretaceous 6,155 ft.

ALABAMA

Clarke County: Sunnyland Contracting Co. 1 Neal, 24-7n-3e. Dry. TD 5,516 ft. Elev 168, Eutaw 3,940 ft., Pilot sand 5,180 ft.

Escambia County: Sunnyland Contracting Co. 1 Ashton, C SW SW 5-1n-10e. Dry. TD 6,009 ft. Elev. 80 ft., Selma 3,081 ft., Eutaw 4,566 ft., lower Tuscaloosa 5,608 ft., Massive 5,751 ft., lower Cretaceous 5,975 ft.

MISSISSIPPI

Marion County: American Liberty Oil Co. 1 Beard, 20-4n-13e. Dry. TD 10,302 ft. Elev. 178 ft., Vicksburg 1,750 ft., Sparta 2,560 ft., Wilcox 3,336 ft., Clark 7,270 ft., lower Tuscaloosa 9,675 ft., lower Cretaceous 10,120 ft.

Wayne County: Gulf Refining Co. 1 Bass, near C NW SW 19-10n-5w. Dry. TD 4,766 ft. Elev. 251 ft.

Wilkinson County: Gulf Refining Co. 32 Crosby, 41-4n-1e. Dry. TD 7,163 ft. Elev. 249 ft., Vicksburg 3,073 ft., Cook Mountain 3,638 ft., Sparta 3,980 ft., Wilcox 4,998 ft., base Bake shale 6,753 ft.

SOUTH LOUISIANA

Ascension Parish: Seaboard Oil Co. of Delaware 1 Ishirn et al, 1-11s-14e. Dry. TD 11,300 ft.

Beauregard Parish: W. H. Francis, Jr., 1 Lutcher-Moore, 15-5s-12w. Dry. TD 7,901 ft.

Calcasieu Parish: W. E. Walker 1 Lawton et al, 24-11s-12w. Dry. TD 9,499 ft.

Cameron Parish: The Texas Co. 2 State-Mallard Bay, 18-13s-3w (Grand Lake area). IP 168 BOPD, ⅛-in., 32.7°, casing perforations 6,092-6,110 ft. TD 9,205 fet. (New field.)

Stanolind Oil & Gas Co. 1-B Henry, 28-14s-9w. IP 282 BOPD, 9/64-in., 36°, casing perforations 9,623-31 ft. TD 11,500 ft. (New pay in Cameron field.)

Plaquemines Parish: Southern Production Co., Inc., 1 State Lease 2122, Tract 5035, Main Pass. Dry. TD 9,378 ft.

St. Bernard Parish: Richardson & Bass 1E-A Humble-State Lease 1851, 31-15s-16e, Tract 4601. Dry. TD 11,047 ft.

St. Charles Parish: California Co. 3 U.S.A., 2-12s-8e. IP 8,900 M.c.f. daily and 28 BCPD (estimated), ⅛-in., 48°, casing perforations 9,210-23 ft. TD 11,600 ft. (Extends Norco field.)

St. Landry Parish: Atlantic Refining Co. 1 Devillie, 23-8s-3e. IP 109 BOPD, 7/64-in., 36.8°, casing perforations 8,790-8,800 ft. TD 9,203 ft. (New pay in North Cankton field.)

Terrebonne Parish: Tide Water Associated Oil Co. 1 Southdown Sugars, 101-17s-17e. IP 145 BCPD and 6,600 M.c.f. daily, 20/64-in., 50.1°, casing perforatins 12,516-60 ft. TD 14,365 ft. (New field—Hollywood.)

NORTH LOUISIANA

Claiborne Parish: Ashland Oil & Refining Co. 1 Kine, 560 ft. N and 666 ft. W of C 12-21n-7w. Dry. TD 5,923 ft.

DeSoto Parish: Barnwell Drilling Co. 1 Evans, C NW SW NW 1-10n-14w. Dry. TD 2,239 ft.

Tensas Parish: Vincent & Welch 1 Panola Co., From Com. cor. of Sec. 14, 15, and 37, go S 52° E along Sec. line 3,550 ft. to loc. on Sec. line of Secs. 14 and 15-11n-12e. Dry. TD 6,365 ft. Wilcox 3,370 ft.

ARKANSAS

Jackson County: Deardorf Oil Corp. 1 Doggett, C NW NW 31-10n-3w. Dry. TD 3,030 ft. Everton 2,922 ft.

Lafayette County: Burnett Producing Co. 1 Williams "A," C NW NW SW 34-15s-24w. Dry. TD 3,009 ft.

Miller County: Skelly Oil Co. 1 Fouke, C NW SE NE 34-16s-27w. Dry. TD 5,620 ft.

Nevada County: Arthur Russell et al 1 Barbaree, 430 ft. S and 1,650 ft. E of NWc 13-14s-23w. Dry. TD 971 ft.

Ouachita County: McAlester Fuel Co. 1 Alley "A," C NE SE NE 1-15s-19w. Dry. TD 2,811 ft.

Woodruff County: Magnolia Petroleum Co. 4 Core test, 2,380 ft. N and 820 ft. W SEc 14-8n-4w. Dry. TD 810 ft.

Magnolia 2 Core test, 180 ft. N and 2,840 ft. E SEc 20-8n-3w. Dry. TD 1,513 ft.

Magnolia 3 Core test, 365 ft. N and 1,250 ft. E SWc 1-7n-3w. Dry. TD 140 ft.

OKLAHOMA

Coal County: Carter Oil Co. 1 Morgan, SW NE SW 3-2n-9e. Dry. TD 8,034 ft.

Creek County: T. Blake Dirickson and D&L Oil Co. 1 Legg, SW NW NW 12-15n-7e. Dry. TD 3,995 ft.

Garfield County: Anchor Petroleum Co. 1 Olmsted, NW NW NE 31-20n-3w. Dry. TD 6,015 ft.

Garvin County: Goldsmith & Perkins 1 Coller, SW NE 24-4n-4w. IPF 64 BOPD, 63°, 10/64-in., 1,014 M.c.f. of gas per day, 7,828-54 ft. TD 8,047 ft.

Hughes County: Okla-Tex Oil Corp. 1 Means, SW NE SE 19-6n-9e. IPP 38 BOPD, 29°, Allen sand 896-925 ft. TD 976 ft.

Lincoln County: Bay Petroleum Corp. 1 Woody, SE NE NE 20-15n-6e. Dry. TD 4,318 ft.

Globe Oil & Refining Co. 1 Etaw, SW NW SW 29-16n-5e. IPF 101 BOPD, Oswego 3,499-3,531 ft., 173 BOPD, Prue 3,577-84 ft. TD 3,675 ft. (New pay at East Parkland).

Logan County: Walter Duncan and Anderson-Prichard Oil Corp. 1 Jackson, NE NE SE 35-15n-4w. IPF 80 BOPD, ¼-in., Prue sand 6,254-82 ft. TD 7,217 ft.

McCurtain County: C. D. Davis et al 1 Whitten, SE NE SW 34-7s-23e. Dry. TD 1,297 ft.

Pawnee County: H. E. R. Drilling Co. 1 Breedlove, SW SW SW 2-22n-4e. Dry. TD 3,561 ft.

Pontotoc County: Davon Oil & Gas Co. 1 Reed, SE SE SW 18-4n-4e. Dry. TD 1,940 ft.

Howard Hogan 1 Cummings, NW NW NE 2-4n-8e. Dry. TD 933 ft.

Pottawatomie County: Bert Aston 1 LaReau, NE NW NW 5-5n-3e. IPF 75 BOPD, 1,000 M.c.f. of gas, Layton sand 2,957-67 ft. TD 2,967 ft.

Sequoyah County: Russell Cobb, Jr., 1 Wilson Ranch, SE SE NW 36-13n-21e. Dry. TD 1,193 ft.

Washita County: Huffman & Malloy 1 Hanza, NW SW SE 33-8n-16w. IP 4,900 M.c.f. gas per day, Springer 5,696-6,106 ft. TD 6,507 ft.

WILDCAT COMPLETIONS

CALIFORNIA

Kern County: Standard Oil Co. of California 525 McNee-36B, SW 36-31s-23e, IPP 10 BOPD plus 175 BWPD, perforations 3,932-4,478 ft., OWDD from 4,560 ft., new TD 4,730 ft. (Extension to Antelope fractured shale pool in Buena Vista Hills.)

Ferguson & Bosworth 42-A Fox-Obrien, NE NW 31-29s-21e, IPP 9 BOPD, 17°, perforations 2,045-65 ft., TD 2,520 ft. (New Eocene field discovery.)

Chanac Associates 3 Chanac, 1-11n-18w, dry, bottomed in granite, TD 832 ft.

Richfield Oil Corp. 1 San Emidio-E, 7-10n-21w, dry, TD 11,600 ft.

Los Angeles County: Castaic Highlands Oil Co. 1 W.W., 18-5n-16w, dry, TD 3,772 ft.

Orange County: A. A. Carrey 1 Bixby-Nohl, 9-4s-9w, dry, bottomed in Sespe, TD 3,758 ft.

San Luis Obispo County: The Texas Co. 1 Laloli, 28-25s-12e, dry, TD 4,587 ft.

Santa Barbara County: Havenstrite Oil Co. 1 Carter-Jim, 18-7n-31w, dry, TD 5,021 ft.

Humble Oil & Refining Co. 1 Federal-Dougherty, 13-9n-26w, dry, TD 6,515 ft.

Slick Moorman Production Co. 44-A Palmer Stendel, N½ 24-9n-33w, IPP 25 BOPD, 18°, perforations 2,353-2,533 ft. in Sisquoc (Pliocene), TD 2,980 ft. (New field discovery 1 mile northeast of West Cat Canyon field.)

The Texas Co. 1 Caldac, 19-7n-31w, dry, TD 2,995 ft.

MONTANA

Fallon County: Shell Oil Co. 22-23 Unit, NW SE NW 33-10n-58e. IPF All intervals 4,253 BOPD, Ordovician 8,653 ft. 2.5 per cent cut, 30.8°, TD 9,412 ft. (Ordovician discovery, new field.)

McCone County: Stanolind Oil & Gas Co.-Amerada Petroleum Corp. 1 State, C NW SE 18n-49e. Dry. TD 10,781 ft. Fish in hole. Red River 10,575 ft.

Stanolind-Amerada 1 NPRR, C SE SE 5-20n-45e. Dry. TD 9,392 ft. Cambrian 9,342 ft.

Fergus County: George Nolan Drilling Co. 1 Udelhoven, SE NE SW 24-22n-18e. Dry. TD 1,358 ft. Temporarily abandoned. Virgelle 1,309 ft.

WYOMING

Lincoln County: Justheim Realty and Wyoming Natural Gas Co. 1 Justheim, S½ N½ NW 15-23n-113w. Dry. TD 3,250 ft. Suspended indefinitely. Almy 1,000 ft.

Natrona Exploration Co. 1 Government, SW SW SE 22-35n-83w. Dry. TD 1,995 ft. Shut down.

Niobrara County: Spriggs & Fletcher 1 Pfister, SW NW NW 8-38n-61w. Dry. TD 3,800 ft. Converse 3,725 ft.

UTAH

Carbon County: El Paso Natural Gas Co. 2 Unit, SW NE SW 36-12s-16e. IP 2,120 M.c.f. of gas per day, 2-in. tubing, Wasatch 2,780 ft. TD 4,984 ft. PBTD 3,231 ft. (Upper Wasatch gas discovery, new field.)

COLORADO

El Paso County: Carl E. Bazley 1 Hayes, C SW¼ 23-14s-67w. Dry. TD 2,083 ft. Standing. Niobrara 2,001 ft.

Nelson-Moore Development Co. 1 Rassner, C SW NW 25-17s-60w. Dry. TD 2,200 ft. Shut down. Hole junked.

Logan County: C. D. Edmonson 1 Wayne Gaynor, NE NE SW 3-6n-53w. Dry. TD 4,730 ft.

Plains Exploration Co. 1 Pinkerton, NE NE SE 17-7n-50w. Dry. TD 4,806 ft.

Lee Swedlund and Sterling Drilling Co. 1 Ziegler-Geer, SW SW NW 32-10n-53w. Dry. TD 5,524 ft.

Logan County: Sunbeam Oil (Eddie Fisher) 1 Hughbanks, SW NW NE 18-7n-54w. Dry. TD 5,465 ft.

Morgan County: Dudley T. Dougherty 1 Neill Rosener, SW NW SW 6-1n-59w. Dry. TD 6,425 ft.

Washington County: Dunn-Somers 1 Barnes, NE NE SE 7-1s-56w. Dry. TD 5,565 ft.

Weld County: Shell Oil Co. 1 Nicklas, SE SE NW 17-9n-56w. Dry. TD 7,270 ft. Big Blue 7,226 ft.

SASKATCHEWAN

Imperial-Tide Water 13-21 Anerley, LSD 13, 21-27-10w3. Dry. TD 3,513 ft.

Tide Water-Dollard-Crown 5-21, LSD 5, 21-7-20w3. Jurassic oil well. TD 4,904 ft.

Royalite 1 Stranraer, LSD 7, 20-31-18w3. Dry. TD 2,884 ft.

Socony-Woodley-Southern 14-3B Wheat Valley, LSD 3, 14-17-17w3. Dry. TD 3,500 ft.

ALBERTA

New British 6 Etzikom, LSD 6, 7-6-8w4. Dry. TD 2,275 ft.

Imperial 1-33 Fairydell Well, LSD 1, 33-57-24w4. Viking sand gas well. TD 4,126 ft.

Quinalta 1-7-24 Morinville, LSD 7, 24-55-25w4. Devonian D1 oil well. IP Est. 1,200 BOPD. TD 4,602 ft. PBTD 3,832 ft.

British-American-Hudson's Bay et al 1 Sharples, LSD 16, 8-30-22w4. Dry. TD 6,840 ft.

Los Angeles Alberta Petroleums, Ltd., 2 Coulee, LSD 7, 18-1-12w4. Dry. TD 2,646 ft.

KANSAS

Barber County: Musgrove 1 Smith, NE NW SE 9-31s-11w. Dry. TD 4,885 ft.

Barton County: Fatzer & Boxberger 1 Weikert, SE SE SE 36-18s-12w. IPP 226 BOPD, Lansing-Kansas City 3,169-76 ft. TD 3,452 ft. (Opens Weikert pool).

Butler County: K. T. Wiedemann 1 Clevenger "B," CWL SW SE 9-27s-7e. Dry. TD 2,706 ft.

E. M. Clickner 1 Miller, SW SW NW 31-29s-5e. Dry. TD 3,475 ft.

Clark County: United Producing 1 Harper, C NW SE 9-34s-21w. IP 14,000 M.c.f. gas per day, Morrow 5,437-69 ft. TD 5,600 ft.

Ellis County: Musgrove 1 Schumacher, SW SW NE 18-14s-20w. Dry. TD 3,870 ft.

Hamilton County: W. J. Coppinger 1 Kritzmire, NW NW SE 24-26s-40w. Dry. TD 5,800 ft. Mississippian 5,488 ft.

Morton County: Cities Service Oil Co. 1 Interstate "A," SE SE NW 19-34s-43w. IP 9,000 M.c.f. of gas per day, Morrow 4,238-50 ft. TD 4,715 ft.

Norton County: Empire Drilling Co. 1 Davis, SE SE SW 26-3s-24w. Dry. TD 3,820 ft.

Pawnee County: Petroleum, Inc., 1 Hauser, SW SE NE 31-21s-15w. IPP 48 BOPD, Arbuckle 3,915-18 ft. TD 3,962 ft. (Opens Evers Northeast pool).

Stanolind Oil & Gas Co. 1 Stolz, NE NE NW 12-22s-15w. Dry. TD 3,945 ft.

Pratt County: Vickers Exploration, Ltd., 1 Walker, NW NW SE 13-26s-11w. Dry. TD 4,464 ft.

Flynn 1 Thompson, NE NE NW 22-28s-15w. TD 4,875 ft.

Rice County: Hinkle 1 Loesch, SE SE SW 26-20s-10w. Dry. TD 3,379 ft.

Rush County: Anschutz Drilling Co. 1 Krug, SW SW SW 1-17s-16w. Dry. TD 3,639 ft.

Palmer 1 Lippert, SW SW NW 5-17s-17w. Dry. TD 3,666 ft.

Sumner County: Natural Gas & Oil 1 McCormick, NE SW NW 31-34s-2e. Dry. TD 3,761 ft.

Trego County: Aurora Gasoline-Veeder 1 Hixson, SE SE SE 2-12s-22w. Dry. TD 4,105 ft.

NEBRASKA

Cheyenne County: James P. Sloss 1 Johnson, SW SW SW 35-15n-53w. Dry. TD 5,640 ft.

SOUTH DAKOTA

Fall River County: Voss & Mars Drilling Co. 1 Porter, CN½ NE SE 20-9s-2e. Dry. TD 2,865 ft. Second Leo 2,775-95 ft.

Potter County: Dakota-Texas Oil Co. 1 Williams-Thompson, C NW SE 27-119n-78w. Dry. TD 3,715 ft. Pre-Cambrian 3,711 ft.

NORTH DAKOTA

Bottineau County: Ray Holbert Drilling Co. 1 Ekrahagen Est., C NE SE 9-163n-78w. IPP 490 bbl. of oil, 31°, 23 per cent water in one month. GOR 450:1. TD 3,086 ft. (Charles discovery, new field.) Charles 3,065 ft. Mission Canyon 3,078 ft.

Williams County: Amerada Petroleum Corp. 1 A. S. Hustveit, C NE SE 23-157n-95w. IPF 346 BOPD, 20/64-in. TD 8,410 ft. PBTD 8,367 ft. Madison 8,085 ft. (Madison discovery, new field.)

K. Alfred Ellison 1 State, C NE NE 16-159n-96w. Dry. TD 8,385 ft. Mission Canyon 7,968 ft.

"I tell you I'm practically shouting into it now!"

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D.C. Notice is hereby given that approximately 1017 acres of land in T. 17 S., R. 28 E., N.M.P.M., within the known geologic structures of the Pecos Valley field and Red Lake field, New Mexico, will be offered in four separate parcels for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre at 1 p. m., Eastern Standard Time, July 22, 1953, when bids will be opened. Details of the lease offering, how and where to submit bids, and a description of the lands may be obtained upon request from the Manager of the Land and Survey Office, Santa Fe, New Mexico, or from the Bureau's Washington office. Edward Woozley, Administrator.

East-of-California Crude Prices Up About 25 Cents

Increases range from 12 to 35 cents per barrel. Some flat-price areas, mostly Rocky Mountain fields, placed on gravity basis

CRUDE prices in fields east of California, excluding Pennsylvania Grade crude, increased $0.25 a barrel for most fields, effective June 15, 1953.

Crude from California fields and from the Pennsylvania Grade area were raised February 16, 1953.

The following gravity and flat-price schedules show the new prices in most of the crude producing areas of the country.

Unless otherwise stated, gravity ranges are from below 20° to 40° and above.

OKLAHOMA

(General Schedule)

Schedule 2: (Below 21° to 40° and above). Purchasers include Sohio Petroleum Co., Bell Oil & Gas Co., Champlin Refining Co., Continental Oil Co., Gulf Oil Corp., Magnolia Petroleum Co., Mid-Continent Petroleum Corp., Phillips Petroleum Co., Shell Oil Co., Skelly Oil Co., Carter Oil Co., Stanolind Oil Purchasing Co., The Texas Co., Tide Water Associated Oil Co., Sinclair Crude Oil Co., Pure Oil Co., Cities Service Oil Co.

Oklahoma (Cement)

Schedule 1: (Below 11° to 40° and above). Sohio Petroleum Co.

Oklahoma (Asphaltum, West Marlow)

Schedule 2: (14° to 40° and above). Sohio Petroleum Co.

KANSAS

Schedule 2: Kansas fields; (Below 21° to 40° and above); Sohio, Continental, El Dorado Refining Co., Gulf, Mid-Continent, Phillips, Shell, Skelly, Carter, Stanolind Oil Purchasing Co., Texas, Sinclair, Pure, Cities Service.

COLORADO

Schedule 2: Colorado sweet; (Below 21° to 40° and above); Sinclair, Pure, Continental, Phillips, Texas.

WYOMING

(Sweet)

Schedule 2: (Below 21° to 40° and above). Fields include Elk Basin (Frontier), Salt Creek (other than Tensleep); Sand Creek, and others. Purchasers include Continental, Stanolind Oil & Gas Co., Ohio Oil Co., Sinclair, Carter, and Stanolind Oil Purchasing. (Pure Oil Co. posts Schedule 2 [25° to 40° and above] for West Poison Spider and Worland [Frontier]).

Wyoming (Sour)

Schedule 3: (General schedule 15° to 40° and above but some companies do not post for lower gravities). Fields include Elk Basin (Tensleep and Madison), Frannie, Winkleman Dome, and others.

Companies posting for the area with gravity limits include Ohio Oil Co. (Below 25° to 35° and above), Sohio (Below 25° to 40° and above), Continental (15° to 40° and above), Stanolind Oil Purchasing Co. and Stanolind Oil & Gas Co. (Below 25° to 40° and above), Carter (15° to 40° and above), Pure and Sinclair (20° to 40° and above).

Other Wyoming

Schedule 4: North Sand Draw unit, Beaver Creek (Tensleep), Riverton Dome. Purchasing companies include Stanolind Oil Purchasing Co. (Below 25° to 40° and above) and Sinclair (Below 20° to 40° and above).
Schedule 5: Fiddler Creek field; (Below 21° to 40° and above); Purchasers include Sohio.
Schedule 6: Lost Soldier (Tensleep, Madison, and Cambrian), Wertz (Tensleep, Amsden, Madison, and Cambrian), Baily Dome (Tensleep), Big Sand Draw, and Mahoney Dome. Purchasers include Sinclair (Below 20° to 40° and above).

MONTANA

Schedule 2: Cut Bank, Kevin Sunburst, Elk Basin (Frontier), Dry Creek. Purchasers include Texas and Phillips (Below 20° to 40° and above), Stanolind Oil & Gas Co., Ohio Oil, and Carter (Below 21° to 40° and above).
Schedule 3: Frannie, Elk Basin (Tensleep and Madison). Purchasers include Stanolind Oil & Gas Co. (Below 25° to 40° and above), Ohio Oil (Below 25° to 35° and above), and Carter (15° to 40° and above).
Schedule 7: Pondera (Below 20° to 40° and above). Phillips.

NEBRASKA

Schedule 2: Sinclair and Pure (25° to 40° and above).

TEXAS

Gulf Coast (Low-Cold-Test Crude)

Schedule 8 (Below 24° to 30° and above). Most of this crude is below 26° gravity. The crude is sometimes classified as Coastal Grade "A." Purchasers include Humble Oil & Refining Co., Stanolind Oil & Gas Co., Stanolind Oil Purchasing Co., The Texas Co., and Sun Oil Co.

Gulf Coast (Hastings and Others)

Schedule 9: Includes Lovells Lake, Raccoon Bend, Goose Creek, Thompson and South Thompson Shallow, Hastings, and others. Purchasers include Humble, Pan American Producing Co., Gulf, and Stanolind Oil & Gas Co.

General Gravity Schedules for Areas East of California

SCHEDULE Gravity—	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Below 11	$1.90																			
11-11.9	1.96														$1.71					
12-12.9	2.02														1.75					
13-13.9	2.08														1.79					
14-14.9	2.14	$2.38													1.83					
15-15.9	2.20	2.40	$1.53												1.87					
16-16.9	2.24	2.42	1.59												1.91					
17-17.9	2.28	2.44	1.65												1.95		$1.87			
18-18.9	2.32	2.46	1.71												1.99		1.89			
19-19.9	2.36	2.48	1.77	$2.41		$2.35	$2.38		$2.81	$2.68	$2.78	$2.73	$2.63	$2.71	2.03	$2.58	1.91	$2.18		$2.30
20-20.9	2.40	2.50	1.83	2.43	$2.28	2.37	2.40		2.83	2.70	2.80	2.75	2.65	2.73	2.07	2.60	1.93	2.20		2.32
21-21.9	2.44	2.52	1.89	2.45	2.30	2.39	2.42		2.85	2.72	2.82	2.77	2.67	2.75	2.09	2.62	1.95	2.22		2.34
22-22.9	2.48	2.54	1.95	2.47	2.32	2.41	2.44		2.87	2.74	2.84	2.79	2.69	2.77	2.11	2.64	1.97	2.24		2.36
23-23.9	2.52	2.56	2.01	2.49	2.34	2.43	2.46	$2.89	2.89	2.76	2.86	2.81	2.71	2.79	2.13	2.66	1.99	2.26		2.38
24-24.9	2.56	2.58	2.07	2.51	2.36	2.45	2.48	2.91	2.91	2.78	2.88	2.83	2.73	2.81	2.15	2.68	2.01	2.28		2.40
25-25.9	2.60	2.60	2.13	2.53	2.38	2.47	2.50	2.93	2.93	2.80	2.90	2.85	2.75	2.83	2.17	2.70	2.03	2.30		2.42
26-26.9	2.62	2.62	2.19	2.55	2.40	2.49	2.52	2.95	2.95	2.82	2.92	2.87	2.77	2.85	2.19	2.72	2.05	2.32		2.44
27-27.9	2.64	2.64	2.24	2.57	2.42	2.51	2.54	2.97	2.97	2.84	2.94	2.89	2.79	2.87	2.21	2.74	2.07	2.34		2.46
28-28.9	2.66	2.66	2.29	2.59	2.44	2.53	2.56	2.99	2.99	2.86	2.96	2.91	2.81	2.89	2.23	2.76	2.09	2.36	$2.83	2.48
29-29.9	2.68	2.68	2.34	2.61	2.46	2.55	2.58	3.01	3.01	2.88	2.98	2.93	2.83	2.91	2.25	2.78	2.11	2.38	2.90	2.50
30-30.9	2.70	2.70	2.39	2.63	2.48	2.57	2.60	3.03	3.03	2.90	3.00	2.95	2.85	2.93	2.27	2.80	2.13	2.40	2.92	2.52
31-31.9	2.72	2.72	2.44	2.65	2.50	2.59	2.62		3.05	2.92	3.02	2.97	2.87	2.95	2.29	2.82		2.42	2.94	2.54
32-32.9	2.74	2.74	2.48	2.67	2.52	2.61	2.64		3.07	2.94	3.04	2.99	2.89	2.97	2.31	2.84		2.44	2.96	2.56
33-33.9	2.76	2.76	2.52	2.69	2.54	2.63	2.66		3.09	2.96	3.06	3.01	2.91	2.99		2.86		2.46	2.98	2.58
34-34.9	2.78	2.78	2.56	2.71	2.56	2.65	2.68		3.11	2.98	3.08	3.03	2.93	3.01		2.88		2.48	3.00	2.60
35-35.9	2.80	2.80	2.60	2.73	2.58	2.67	2.70		3.13	3.00	3.10	3.05	2.95	3.03		2.90		2.50	3.02	2.62
36-36.9	2.82	2.82	2.64	2.75	2.60	2.69	2.72		3.15	3.02	3.12	3.07	2.97	3.05		2.92		2.52		2.64
37-37.9	2.84	2.84	2.66	2.77	2.62	2.71	2.74		3.17	3.04	3.14	3.09	2.99	3.07		2.94		2.54		2.66
38-38.9	2.86	2.86	2.68	2.79	2.64	2.73	2.76		3.19	3.06	3.16	3.11	3.01	3.09		2.96		2.56		2.68
39-39.9	2.88	2.88	2.70	2.81	2.66	2.75	2.78		3.21	3.08	3.18	3.13	3.03	3.11		2.98		2.58		2.70
40 and above	2.90	2.90	2.72	2.83	2.68	2.77	2.80		3.23	3.10	3.20	3.15	3.05	3.13		3.00		2.60		2.72

Gulf Coast (Anahuac and Others)

Schedule 10: Includes selected crudes in the Upper Texas Gulf Coast, mostly above 26° gravity, and Sweden grade crude from some of the fields in the Lower Texas Gulf Coast. Purchasers include Humble, Sun, Magnolia Petroleum Co., Sinclair, Atlantic Refining Co., Texas, Cities, Shell, Republic Oil Refining Co., Pure, Pan American Producing Co., Gulf, and Sohio.

Gulf Coast (Refugio Crude)

Schedule 11: Includes other similar crudes in the Texas Gulf Coast. Purchasers include Humble, Sinclair, Atlantic, Cities Service, Sun, and Republic.

Gulf Coast (Mirando Crude)

Schedule 11: (Below 24° to 29° and above). Mirando-type crude in the Texas Gulf Coast. Purchasers include Humble, Magnolia, Texas, Sinclair, and Sun.

Gulf Coast

(Selected Sweden and Other Southwest)

Schedule 12: Purchasers include Humble, Cities Service, Pure, Sun, Sohio, Stanolind Oil & Gas, and Continental.

Gulf Coast (Other Selected Sweden Crudes)

Schedule 12 plus 10 cents: Sweden-grade crude from Armstrong, Colorado, Kelsey, and San Pablo. Purchasers include Humble and Sun.

Gulf Coast (Southwest Crudes)

Schedule 12 minus 18 cents: Crude from Charlotte and West, Imogene and Southwest, Imogene (South Carrizo), Jourdanton, Pita, Rita, and Sarita. Purchased by Humble. Schedule 12 minus 8 cents: Aransas Pass (Below 30° to 40° and above).

Gulf Coast (Selected Southwest Texas Crude)

Schedule 20: (Below 20° to 40° and above). Crude from Pershall (Austin Chalk, and Pershall (Navarro). Purchased by Humble.

Gulf Coast (Selected Crude in Dist. 3)

Schedule 13: Purchasers include Stanolind Oil Purchasing (Below 21° to 40° and above) and Phillips (Below 20° to 40° and above).

Gulf Coast (Selected Crudes—Dists. 2 and 3)

Schedule 14: (Sinclair starts at below 24°). Includes crude from Hardin, Brazoria, Jackson, Matagorda, and Orange counties. Purchasers include Texas, Sinclair, Phillips, Sohio, and Pure.

East Central Texas

Schedule 2 plus 2 cents: Crude from Anderson, Cherokee, Freestone, Houston, Limestone, and Navarro counties. Purchasers include Humble and Sinclair. (Sinclair posts below 25° and 40° and above).

East Central Texas

(Hawkins and Other)

Schedule 2 minus 43 cents: (Below 15° to 29° and above). Includes Hawkins, Pewitt Ranch, Sugar Hill, and Talco. Purchasers include Texas and Humble.

East Central Texas

(Anderson, Smith, and Wood Counties)

Schedule 15: (Below 12° to 32° and above). Pine Mills and Quitman (Eagle Ford, Sub-Clarksville), Cayuga, Deu Pree (Sub-Clarksville, Woodbine), Earl Lee, Forest Hill, Manziel, Merigale-Paul, Noland Edwards, Sand Flat. Purchasers include Pure (15° to 29° and above), Pan American Producing, and Sohio.

North and West Central Texas

Schedule 2: Includes crude from North, North Central, and West Central Texas. Purchasers include Pure, Texas, Humble, Sinclair, Stanolind Oil Purchasing, Continental, Cities Service, Gulf, and Magnolia (starts at below 29°).

Panhandle Texas

Schedule 2: Purchasers include Texas, Phillips, Magnolia (starts at below 29°), Humble, Sohio, Gulf, and Wilcox Oil Co. (starts at 25°).

West Texas (Sweet)

Schedule 2: Purchasers include Sun (starts at below 24°), Atlantic, Shell, Pan American Producing, Cities Service, Stanolind Oil Purchasing (starts at below 21°), Sinclair (starts at below 25°), Texas, Phillips, Magnolia (starts at below 25°), Humble, Sohio, Gulf, Pure, and Ashland Oil & Refining Co.

West Texas (Intermediate)

Schedule 4: Purchasers include Pure, Republic Oil Refining, Gulf, Sohio, Magnolia, Phillips, Texas, Sinclair, Stanolind Oil Purchasing (starts at below 25°), Cities Service, Pan American Producing, Shell, Atlantic, and Humble.

West Texas (Sour)

Schedule 6: Purchasers include Stanolind Oil & Gas, Stanolind Oil Purchasing, Cities Service, Ohio Oil, Pure, Gulf, Sohio, Magnolia, Phillips, Texas, Sinclair, Col-Tex Refining Co., Shell, Atlantic, Humble. (Pecos County changed to this schedule on a gravity basis.)

NEW MEXICO

(Intermediate)

Schedule 4: Purchasers include Continental, Stanolind Oil Purchasing (starts at below 25°), Cities Service, Pure, Gulf, Magnolia, Phillips, Texas, Sinclair, Shell, Atlantic, Humble.

(Sour)

Schedule 6: Purchasers include Continental (starts at below 29°), Humble, Atlantic, Shell, Sinclair, Texas, Magnolia, Gulf, Cities Service, and Stanolind Oil Purchasing.

LOUISIANA-ARKANSAS

South Louisiana

Schedule 13: Purchasers include Continental, Shell, Texas, Magnolia, Cities Service, Stanolind Oil Purchasing, Tide Water Associated, Sohio, Pan American Producing, Gulf, Pure, Stanolind Oil & Gas, Sun, Esso Standard Oil Co. (Louisiana Division).

South Louisiana (Vinton, Starks, and Other)

Schedule 10: Postings by Gulf. (Below 20° to 34° and above for Leeville). (Gulf posts Schedule 10 plus 2 cents for Cameron Meadows—below 18° to 34° and above).

South Louisiana (Low Cold Test)

Schedule 8 (Below 24° to 29° and above). Purchasers include Cities Service and Sun. Schedule 8 minus 5 cents: Pan American Producing (Below 24° to 27.9°). Shell (Below 20° to 29° and above).

East and Central Louisiana (Hemphill, Holly Ridge, Lake St. John Crude and Others)

Schedule 16: Purchasers include Stanolind Oil Purchasing, Gulf, Esso, Sohio, Stanolind Oil & Gas. Jennings (Evangeline) takes Schedule 16 but starts at below 32°.

North-Central and East Louisiana (Delhi, Big Creek and Others)

Schedule 16 minus 5 cents: Purchasers include Sun, Sohio, Esso, and Stanolind Oil Purchasing.

North Louisiana and Arkansas (Rodessa, Caddo, Magnolia-Limestone and Sandstone and Others)

Schedule 2: Purchasers include Gulf, Esso, Sohio, and Stanolind Oil & Gas (starts at below 25°).

North Louisiana and Arkansas (Lisbon, Ora, and Other La.)

(Fouke, Falcon, Stephens, and Other Ark.)

Schedule 7: Purchasers include Gulf, Esso, Sohio, Ohio (25°-35.9°).

Arkansas

(Gum Creek—Blossom and Tokio Sands)

Schedule 18: Posting by Sohio.

MISSISSIPPI

Central Mississippi

(Brookhaven, Cranfield, and Others)

Schedule 16: Purchasers include Esso, Sohio, and Pure.

Central Mississippi

(Church Hill, Overton and Others)

Schedule 16 minus 5 cents: Purchasers include Esso and Sohio.

Mississippi (Heavy)

(Eucutta, Heidelberg, and Others)

Schedule 17: (Below 18° to 40° and above). Purchasers include Gulf and Esso.

Mississippi (Tinsley and Others)

Schedule 7 minus 5 cents. Purchasers include Sohio.

Mississippi (Pickens)

Schedule 4: (24° to 40° and above). Posting by Carter.

EASTERN ILLINOIS AND WESTERN INDIANA

Schedule 19: (Below 29° to 35° and above). Many of fields carry flat prices, but Schedule 19 is posted by Ohio Oil.

Selected Flat Prices

PENNSYLVANIA GRADE
(Effective Feb. 16, 1953)

Bradford, Allegany	$4.40
Middle Pennsylvania	4.40
Southwest Pennsylvania	3.97
West Virginia, Ohio	3.20

ILLINOIS BASIN

Louden, Mattoon, Ill.	3.02
Plymouth, Ill.	2.69
Owensboro, Ky. (area)	3.02
Butler County, Ky.	2.65

ROCKY MOUNTAIN

Darlington, Mont.	2.60
Byron and Garland, Wyo.	1.75
Oregon Basin, Wyo.	1.65
Hidden Dome, Wyo.	1.65
Big Sand Draw, Wyo. (cond.)	2.90
Cat Creek, Mont.	2.90

ARKANSAS

Gum Creek (crude)	1.92
Limestone condensate	2.95
Sandstone condensate	3.00
Smackover (crude)	2.33

LOUISIANA

Bear, Ville Platte, West Mermentau	3.05
Creole (crude)	2.91
Cotton Valley (Holloway crude)	2.95
Cotton Valley (cond.)	3.00
Athens (cond.)	2.95
South Delhi (cond.)	2.70
East Haynesville (crude)	2.95
Lake St. John (cond.)	3.00
Bell City (cond.)	3.05
Offshore cond. (St. Mary, Cameron)	3.15
Sweet Lake (crude)	2.81
Bayou Pigeon	2.95

MISSISSIPPI

Carthage Point (cond.)	3.10
Gwinville, Soso (cond.)	3.00
Baxterville (cond.)	2.75
Baxterville (crude)	1.50

TEXAS

East Texas field	2.90
Red Springs, Long Lake, Tennessee Colony, Jacksonville, Prairie Lake, Opelika, Tri-Cities	2.90
Conroe, Tomball	3.13
Clay Creek	2.65
Darst Creek, Salt Flat	2.79
Mt. Sylvan, Van	2.73
Agua Dulce (Republic Oil)	3.10
New Ulm	2.80
Chapel Hill (crude)	2.83
Chapel Hill (cond.)	2.90
North Vidor	3.05
Lutton Springs	2.82
Willamar	2.70
Cayuga (cond.)	2.90
Benedum (cond.)	2.90

SELECTED MICHIGAN

Cato	2.91
Isabella, Coldwater, Stanton	3.10
Douglas	2.96
Sterling (sour)	2.75
Pine River, Elba	3.00

California Crude-Oil Prices

STANDARD OIL CO. OF CALIFORNIA—PRICES EFFECTIVE FEBRUARY 16, 1953
(All gravities above those quoted take highest price offered for that field)

SCHEDULE Gravity—	1	2	3	4	5	6	7	8	9
12-12.9	$1.42	$1.44	$1.56		$1.60	$1.68			
13-13.9	1.49	1.51	1.63		1.67	1.72			
14-14.9	1.55	1.57	1.70	$1.73	1.77	1.77	$1.86	$1.91	$1.92
15-15.9	1.60	1.62	1.75	1.78	1.85	1.85	1.93	1.97	1.97
16-16.9	1.65		1.79	1.84	1.92	1.94	2.00	2.04	2.03
17-17.9	1.71		1.84	1.90	1.99	2.02	2.07	2.11	2.08
18-18.9	1.76		1.88	1.95	2.07	2.10	2.14	2.19	2.14
19-19.9			1.93	2.01	2.14		2.21	2.27	2.19
20-20.9				2.05	2.21		2.27	2.34	2.24
21-21.9				2.10	2.30		2.34	2.42	2.29
22-22.9				2.17			2.41	2.49	2.35
23-23.9				2.24			2.48	2.56	2.41
24-24.9				2.30			2.56		2.48
25-25.9				2.36			2.65		2.54
26-26.9							2.73		2.61
27-27.9									2.69
28-28.9									2.76

SCHEDULE Gravity—	10	11	12	13	14	15	16	17	18
24-24.9			$2.55						
25-25.9			2.60					$2.71	
26-26.9			2.65					2.76	
27-27.9	$2.60		2.70	$2.51				2.82	
28-28.9	2.67		2.75	2.58		F.O.B.		2.88	$2.84
29-29.9	2.74			2.66		Ship		2.94	2.91
30-30.9	2.80			2.73				2.99	2.98
31-31.9	2.87	$2.93				$3.02		3.06	3.05
32-32.9	2.95	3.00				3.09		3.12	3.12
33-33.9	3.02	3.07				3.17		3.18	3.20
34-34.9	3.09	3.14			$3.14	3.23		3.24	3.27
35-35.9	3.15	3.21			3.20	3.30	$3.21		
36-36.9	3.20	3.25			3.24	3.34	3.27		
37-37.9	3.24	3.30			3.29		3.32		
38-38.9	3.28	3.35			3.33		3.37		
39-39.9	3.33	3.40			3.37				
40-40.9	3.37	3.45			3.41				

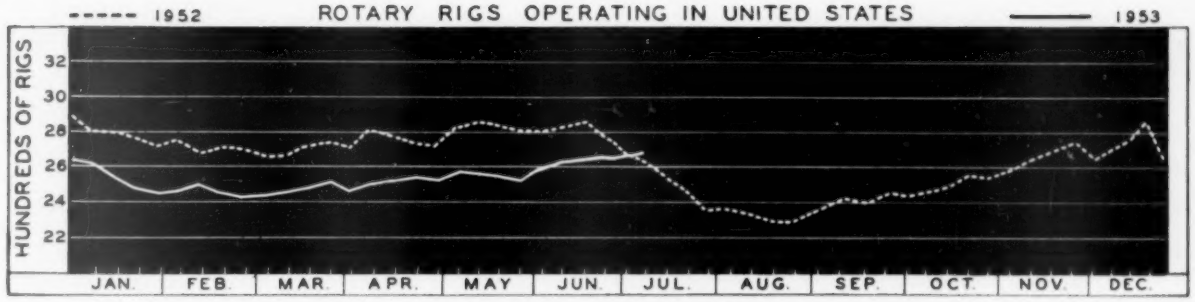
SCHEDULE Gravity—	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37
12-12.9														$1.77	$1.74	$1.80		$1.74	
13-13.9														1.79	1.80	1.84		1.77	
14-14.9	$1.87	$1.98	$1.74		$1.96	$1.98		$1.95	$1.97		$1.88			1.83	1.87	1.90		1.82	
15-15.9	1.93	2.04	1.81		2.02	2.04		2.01	2.04		1.97			1.90	1.94	1.97		1.90	
16-16.9	1.99	2.10	1.88		2.08	2.10		2.08	2.11		2.05			1.98	2.00	2.03		1.97	
17-17.9	2.05	2.17	1.95		2.14	2.16		2.14	2.19		2.14	$2.01		2.05	2.08	2.09		2.05	
18-18.9	2.11	2.23	2.02		2.20	2.23		2.21	2.26		2.22	2.08		2.13	2.17	2.16		2.14	
19-19.9	2.18	2.29	2.09		2.26	2.30	$2.23	2.29	2.33		2.31	2.15		2.20	2.25	2.24		2.24	
20-20.9	2.24	2.34	2.15		2.31	2.36	2.31	2.36	2.39		2.38	2.20	$2.08	2.27	2.32	2.31	$2.25	2.32	
21-21.9	2.30	2.41	2.23		2.38	2.42	2.40	2.43	2.47		2.47	2.27	2.17	2.36	2.39	2.39	2.34	2.41	
22-22.9	2.37	2.48	2.30		2.44	2.48	2.49	2.50	2.55		2.55	2.34	2.26	2.44	2.45	2.47	2.42	2.49	$2.38
23-23.9	2.45	2.55	2.38		2.51	2.55	2.58	2.57	2.63	$2.49	2.64	2.40	2.34	2.52	2.52	2.54	2.51	2.56	2.44
24-24.9	2.53	2.62	2.46	$2.53	2.58	2.61	2.66	2.64	2.71	2.55	2.72	2.47	2.41	2.60	2.58	2.60	2.59	2.64	2.49
25-25.9	2.61	2.69	2.54	2.60	2.65	2.68	2.74	2.70	2.79	2.62	2.81	2.53	2.49	2.68	2.64	2.65	2.66	2.71	2.58
26-26.9	2.69	2.76	2.62	2.67	2.72	2.74	2.82	2.76	2.86	2.68	2.89	2.60	2.57	2.76	2.70	2.71	2.73	2.78	2.64
27-27.9	2.76	2.82	2.70	2.75	2.78	2.80	2.90	2.82	2.92	2.74	2.98	2.68	2.65	2.84	2.76	2.77	2.80	2.85	2.71
28-28.9	2.83	2.89	2.78	2.82	2.84	2.85	2.97		2.98	2.80	3.07	2.75	2.73	2.91	2.83	2.82	2.87	2.92	2.78
29-29.9	2.91	2.95		2.89	2.90	2.91			3.03	2.87	3.15	2.82	2.80	2.98	2.89	2.88	2.94	2.99	2.84
30-30.9	2.97	3.01		2.95	2.95	2.96			3.07	2.92	3.23	2.88	2.87	3.04	2.94	2.93	3.00	3.04	2.90
31-31.9	3.04	3.07		3.02		3.02			3.12	2.98		2.95	2.94	3.11	3.00	2.99		3.10	2.97
32-32.9	3.12			3.09					3.17	3.05		3.02	3.01		3.05	3.05		3.17	3.03
33-33.9				3.17					3.22	3.11		3.09	3.08		3.11	3.11		3.22	3.10
34-34.9				3.24					3.27	3.17		3.16	3.15		3.16	3.17		3.26	3.17
35-35.9				3.32					3.33	3.24		3.23	3.23		3.21	3.24		3.30	3.23
36-36.9									3.37			3.29				3.28		3.33	3.28
37-37.9									3.41			3.34				3.31		3.36	3.32
38-38.9									3.45			3.39				3.35		3.39	3.37
39-39.9									3.49			3.44				3.39		3.43	3.41
40-40.9									3.53			3.49				3.43		3.47	3.46

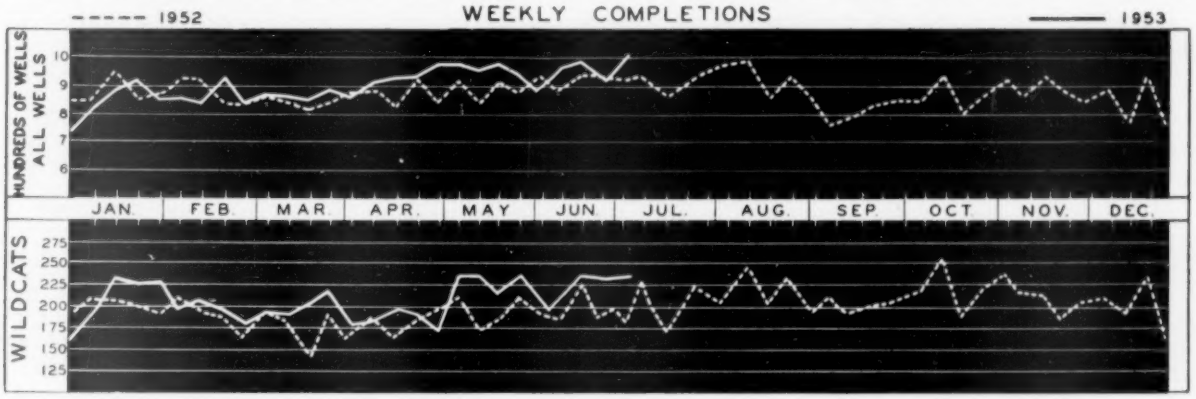
Fields and Schedule Numbers of Standard of California Postings

Field—	Schedule
Aliso Canyon	29
Athens-Rosecrans	18
Brea-Olinda	25
Buena Vista Hills	32
Canfield Ranch	12
Coalinga	34
Coles Levee	10
Cymric	36
Del Valle	30
East Coyote	26
Edison	5
Elk Hills (Shallow)	32
Elk Hills (Stevens)	10
El Segundo	21
Elwood	15
Gato Ridge	1
Greeley	10
Guijarral Hills	14
Huntington Beach	23
Inglewood	24
Kern Front	6
Kern River	6
Kettleman Hills	11
Lakeview area	32
Leffingwell	16
Los Flores	2
Lost Hills	33
McClung	13
McKittrick	6
Midway-Sunset	32
Montebello	27
Montalvo, West	37
Mountain View	31
Mount Poso	6
Newport-Anaheim Sugar	4
Newport—Other than Anaheim Sugar area	8
Pleasant Valley	34
Raisin City	34
Richfield	7
Round Mountain	6
Santa Fe Springs	17
Santa Maria Valley	3
Seal Beach	22
Signal Hill (Long Beach)	19
Torrance	9
Wasco	10
West Cat Canyon	2
West Coyote	28
Wheeler Ridge	35
Whittier	26
Wilmington	20

Other Selected California Crudes

Field—	Gravity range	Price range
General Petroleum Corp.:		
Buena Vista	24-30.9	2.55-2.92
Capitan	22-37.9	2.25-3.21
Newhall, Placerita	11-24.9	1.56-2.41
Tejon Ranch	15-31.9	1.90-3.11
Tejon Hills	26-30.9	2.73-3.00
Union Oil Co. of Calif.:		
Alamitos, Seal Beach	24-35.9	2.53-3.32
Rosecrans, Dominguez	23-40.9	2.57-3.48
Ventura Avenue, Rincon	26-33.9	2.62-3.13
Lompoc, Orcutt	16-29.9	1.85-2.68
Richfield Oil Corp.:		
Cuyama Valley	27-40 and above	2.55-3.32
Wheeler Ridge (Eocene)	34-39.9	3.26-3.43





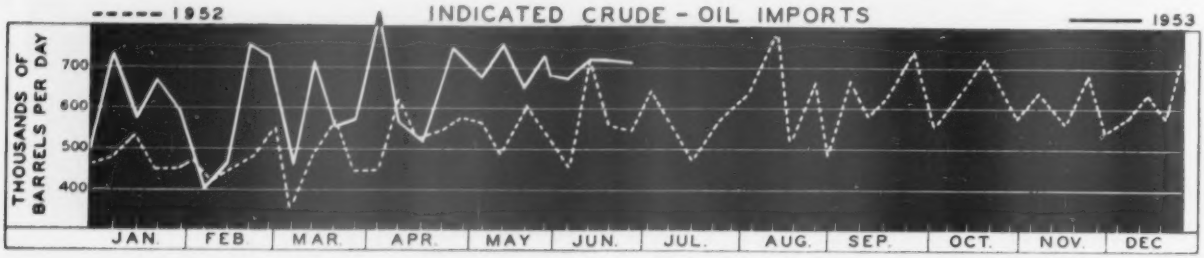
CURRENT STATISTICS

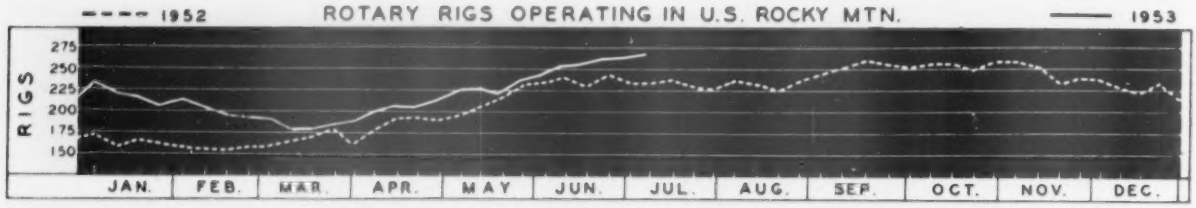
EXPLORATION

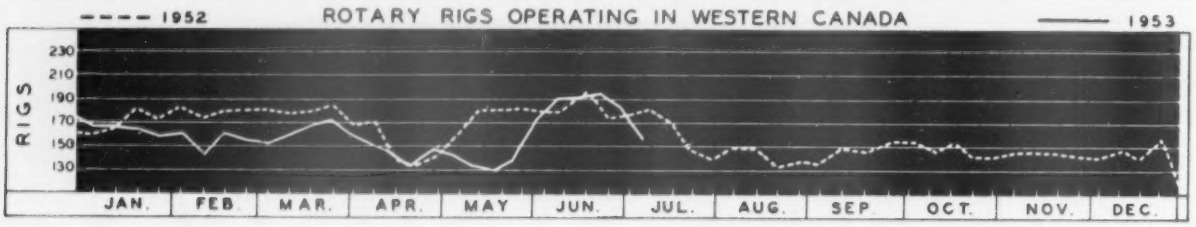
WEEKLY WELL COMPLETIONS . . . WEEK ENDED JULY 4, 1953

	Total of all wells					July 4		Wildcat completions and discoveries					Cumulative total, 1953				
	Comp.	Oil	Gas	Dry	Footage	1953	1952	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	14	7	0	*7	21,600	348	399	0	0	0	0	0	0	0	0	0	0
Pennsylvania	32	17	3	‡12	55,450	854	900	0	0	0	0	0	0	0	3	8	11
West Virginia	24	2	13	9	58,591	311	313	0	0	1	0	1	0	0	5	3	8
Ohio	26	9	3	‡14	55,281	511	509	0	0	0	0	0	1	0	1	10	12
Indiana	30	10	0	20	42,226	614	588	1	0	0	11	12	9	0	2	153	164
Kentucky	22	10	2	10	44,778	531	679	0	0	0	4	4	6	0	1	96	103
Illinois	39	18	0	21	102,578	892	886	1	0	0	8	9	4	0	0	192	196
Michigan	11	5	1	5	24,813	275	346	0	0	0	4	4	9	0	4	109	122
Kansas	107	49	17	§41	381,958	2,486	2,431	2	0	2	14	18	58	0	21	386	465
Nebraska	7	3	0	4	35,927	159	123	0	0	0	1	1	12	0	2	67	81
Oklahoma	154	92	14	‡48	506,140	3,607	2,991	5	0	1	9	15	61	4	18	327	410
Texas	352	209	16	127	1,638,762	8,745	9,333	21	1	4	81	107	444	33	102	2,116	2,695
North Central (Dist. 7-B & 9)	157	96	1	60	538,048	3,246	2,932	11	0	0	34	45	237	0	10	855	1,102
West (Dist. 7-C & 8)	61	46	1	14	338,634	1,884	2,926	6	0	1	9	16	87	2	7	333	429
Panhandle (Dist. 10)	10	6	3	1	31,821	410	344	0	0	0	0	0	0	2	0	14	16
Eastern (Dist. 5 & 6)	9	2	2	5	46,762	412	459	0	0	1	4	5	12	2	4	139	157
Gulf Coast (Dist. 2 & 3)	61	25	7	29	427,085	1,307	1,387	2	1	2	20	25	56	11	43	340	450
Southwest (Dist. 1 & 4)	54	34	2	18	256,412	1,486	1,285	2	0	0	14	16	52	16	38	435	541
Louisiana	52	34	1	17	367,699	1,279	1,148	3	2	0	8	13	35	18	11	183	247
Northern	20	11	1	8	75,289	504	609	0	0	0	3	3	4	1	2	60	67
Southern	32	23	0	9	292,410	775	539	3	2	0	5	10	31	17	9	123	180
Arkansas	13	1	0	12	32,219	225	199	0	0	0	8	8	6	0	0	50	56
Mississippi	5	2	0	3	39,085	182	182	0	0	0	3	3	9	0	3	87	99
Southeastern States	3	0	0	3	17,905	70	33	0	0	0	3	3	1	0	0	54	55
Montana	13	8	0	5	61,082	189	121	1	0	0	3	4	4	0	0	47	51
Wyoming	10	7	0	3	49,273	319	329	0	0	0	3	3	10	0	0	55	65
Colorado	19	5	4	10	85,738	283	204	0	0	0	9	9	14	0	8	134	156
Utah	3	2	1	0	16,755	38	36	0	0	1	0	1	2	0	1	22	25
New Mexico	15	4	9	2	83,875	658	526	0	0	0	1	1	8	0	7	62	77
California	43	34	0	9	173,883	1,288	1,275	3	0	0	8	11	30	0	4	291	325
North Dakota	6	3	0	3	40,055	130	25	2	0	0	1	3	5	0	0	24	29
Miscellaneous (Md., S. D.)	3	0	1	2	13,818	29	40	0	0	1	2	3	1	0	1	23	25
Total United States	1,003	531	85	387	3,949,491	24,023	23,616	39	3	10	181	233	729	55	194	4,499	5,477
Total previous week	918	437	71	410	3,708,848			22	5	9	194	230	690	52	184	4,318	5,244
Total July 5, 1952	930	485	79	366	3,736,657			14	2	2	161	179	710	50	127	4,137	5,024

Service wells included: *7, ‡11, ‡5, §2.



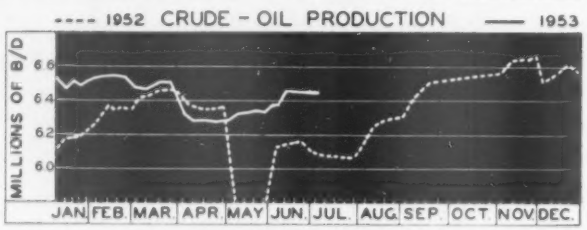


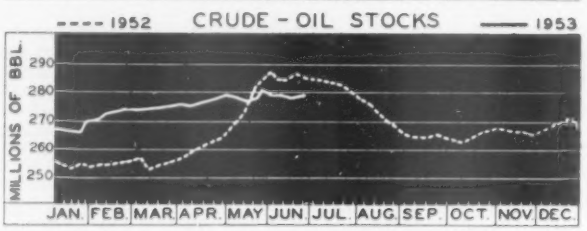


DAILY AVERAGE PRODUCTION FOR WEEK

	July 4			June 27
	Crude oil	Lease condensate	Total	total
Alabama	4,900		4,900	4,900
Arkansas	77,550	650	78,200	78,550
California	1,015,800		1,015,800	1,014,700
Colorado	107,800		107,800	102,700
Eastern	59,100		59,100	59,000
Florida	1,550		1,550	1,550
Illinois	164,500		164,500	161,500
Indiana	35,500		35,500	35,700
Kansas	298,100		298,100	316,400
Kentucky	30,200		30,200	30,400
Louisiana	639,925	40,500	680,425	703,350
North	109,200	2,500	111,700	114,000
South	530,725	38,000	568,725	589,350
Michigan	34,100		34,100	33,900
Mississippi	93,150	4,150	97,300	97,500
Montana	30,400		30,400	30,600
Nebraska	13,400		13,400	13,400
New Mexico	196,175	850	197,025	195,925
Oklahoma	537,800		537,800	538,900
Texas	2,786,425	44,800	2,831,225	2,805,350
Dist. 1	37,350	300	37,650	36,700
Dist. 2	154,700	6,000	160,700	159,650
Dist. 3	450,750	22,200	472,950	469,875
Dist. 4	262,975	6,000	268,975	264,600
Dist. 5	49,275	350	49,625	49,100
Dist. 6	124,175	5,050	129,225	126,675
East Texas field	249,850		249,850	253,000
Dist. 7-B	116,975	50	117,025	115,950
Dist. 7-C	162,050	4,000	166,050	165,725
Dist. 8	920,925	400	921,325	911,000
Dist. 9	181,500	400	181,900	177,950
Dist. 10	75,900	50	75,950	75,125
Utah	5,300		5,300	5,400
Wyoming	210,000		210,000	209,200
North Dakota	14,600		14,600	14,500
Total U. S.	6,356,275	90,950	6,447,225	6,453,425
Change from previous week, down			6,200	
Canada	222,400		222,400	250,100
Total U. S. production January 1-July 4			1,189,008,000 bbl.	
Same period last year (crude plus cond.)			*1,136,946,000 bbl.	

*Includes 16,484,510 bbl. condensate.



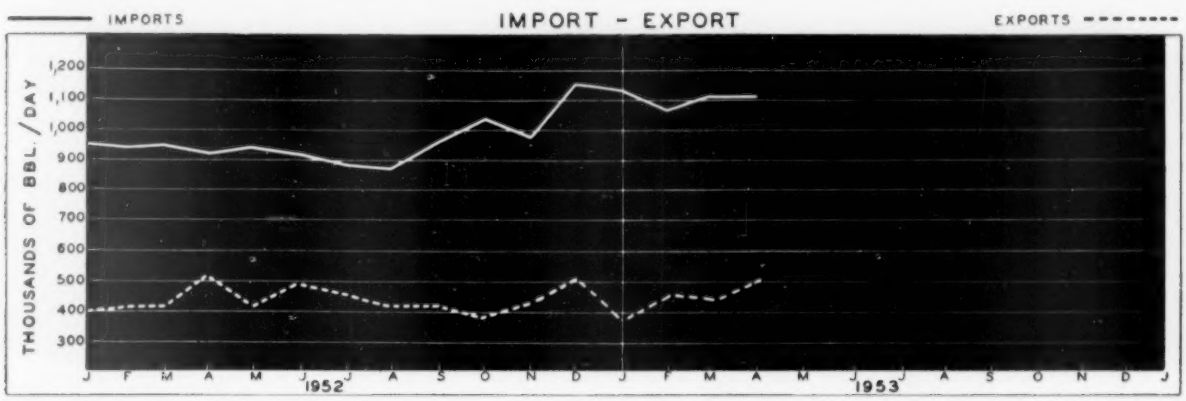


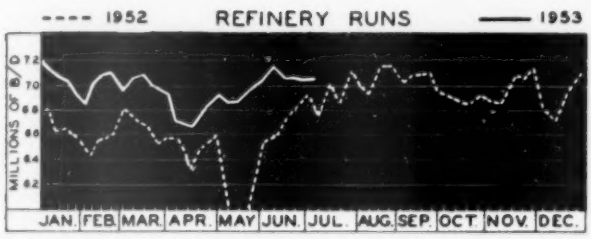
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

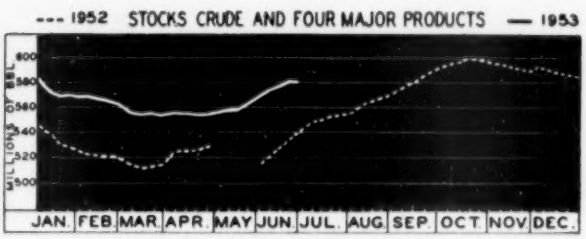
(Thousands of barrels)

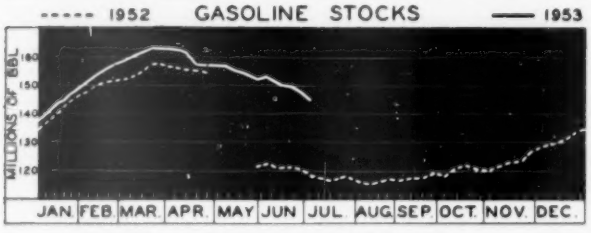
	June 27, '53	June 20, '53	June 28, '52
Pennsylvania Grade	2,705	2,648	2,343
Other Appalachian	2,226	2,410	2,017
Illinois, Indiana, Michigan	11,924	11,918	12,923
Arkansas	2,727	2,698	3,261
Louisiana	15,385	15,740	15,027
North	2,504	2,574	2,442
Gulf	12,881	13,166	12,585
Mississippi	3,826	3,762	3,377
New Mexico	7,246	7,293	7,818
Oklahoma and Kansas	39,264	39,037	43,635
Texas	133,399	131,247	142,264
East Texas proper	11,440	10,891	14,208
West Texas	61,890	61,894	62,415
Texas Gulf	26,692	25,977	30,442
Other Texas	33,377	32,485	35,199
Rocky Mountain	16,656	17,581	15,107
California	33,127	32,861	30,911
Foreign	†11,373	11,348	7,917
Total	279,858	278,543	286,600

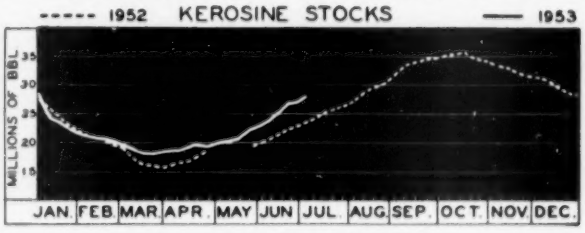
*Bureau of Mines. †Includes 2,766,000 bbl. in California.

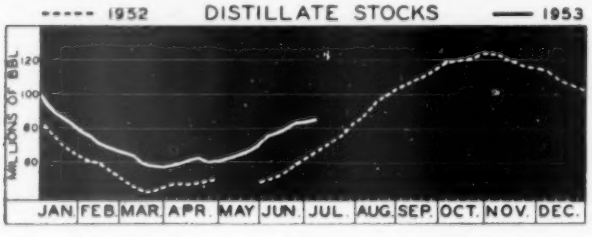


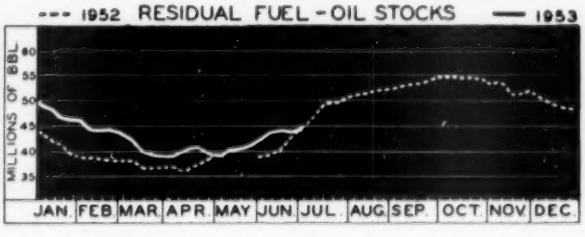










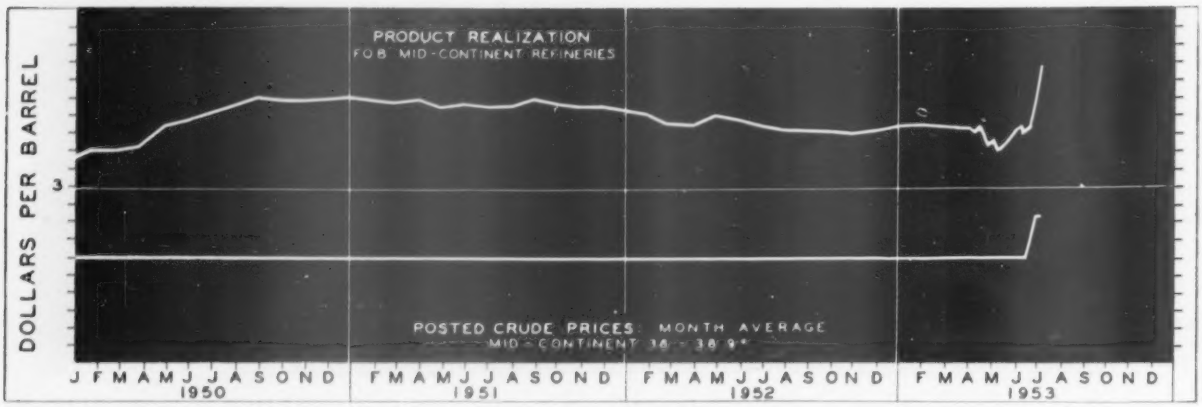


A.P.I. REFINERY REPORT, JULY 4

(Thousands of barrels)

District—	Daily avg. runs	Daily average production—Gaso.*	Kero.	Dist.	Resid.	Stocks‡—Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, July 1952 Daily avg. runs	Daily average production—Gaso.*	Kero.	Dist.	Resid.
East Coast	1,101	408.0	35.7	298.4	252.0	33,531	11,177	27,477	11,511	1,056	416.2	46.3	234.4	235.0
Appalachian:														
District 1	116	51.0	5.3	19.2	15.1	3,628	520	867	550	105	45.5	4.9	14.9	11.4
District 2	95	43.3	6.6	15.0	13.9	1,311	379	495	156	81	42.0	2.8	14.3	10.7
Ind., Ill., Ky.	1,259	677.6	69.0	212.0	175.3	28,300	5,810	13,831	3,815	1,300	691.4	72.1	238.9	150.5
Okla., Kans., Mo.	650	365.9	20.3	148.2	55.7	14,888	1,848	9,695	1,211	610	343.9	15.2	142.8	58.3
Inland Texas	281	167.7	12.2	52.4	42.1	6,011	480	1,659	1,380	273	188.0	13.1	44.6	40.9
Texas Gulf Coast	1,634	814.3	105.0	385.9	228.1	20,103	3,836	12,818	6,436	1,648	743.9	138.7	412.8	265.0
La. Gulf Coast	585	292.8	65.1	136.4	53.1	7,350	2,602	5,495	1,295	531	232.8	48.4	148.1	51.7
N. La. and Ark.	86	32.0	6.9	23.7	7.6	3,127	512	736	111	77	31.9	5.8	18.6	6.1
Rocky Mountain:														
New Mexico	20	12.4		2.9	3.9	200		37	31	20	12.4	0.4	2.9	4.1
Other Rocky Mt.	236	113.7	2.1	56.4	38.6	6,055	267	2,113	1,026	241	112.4	3.5	46.4	41.8
California	990	456.1	5.7	143.4	380.3	19,993	443	11,051	17,216	985	434.2	6.3	156.6	361.2
July 4, 1953	7,053	3,434.9	333.9	1,493.9	1,265.7	144,497	27,874	86,274	44,738	6,927	3,294.6	357.5	1,475.3	1,236.7
June 27, 1953	7,047	3,510.1	352.9	1,475.1	1,262.0	146,695	26,956	83,131	43,599					
July 5, 1952	6,753	3,222.4	348.6	1,375.6	1,239.1	119,533	23,312	67,542	46,172					

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipe lines.


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
DOLLARS PER BARREL
3
POSTED CRUDE PRICES: MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
J F M A M J J A S O N D
1950
F M A M J J A S O N D
1951
F M A M J J A S O N D
1952
F M A M J J A S O N D
1953

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate and fuel oil. Realization averaged $3.70 for week ended June 27, $3.36 for previous week, and $3.39 for June 1952. The above trend information is based on volumes and current prices and therefore does not reflect changes in operating costs.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of July 8, 1953. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline	11⅜-11⅝	13.5-13.8	11.5-11.75
Premium gasoline	12⅜-12⅞	14.5-14.8	12.5-12.75
42-44 w.w. kerosine	8.875-9.25	10.15-10.4	9.5
No. 2 straw fuel oil	8-8.25	9.15-9.4	8.5
No. 6 residual	$1.05-1.20	$2.25-2.40	$1.75-1.90

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5½	5	5¼
Grade 18-55	6.60	6.10	6.35

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	12-13.5
750 vis., No. 3-4 neutral	15-16.5
2,000 No. 5-6 neutral	17-18.5

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	19.5-20.5
200 vis., No. 3 neutral, 0-10 pp.	13

Western Pennsylvania

145-155 vis., 10 p.t. bright stock	25.5
180 vis., 10 p.t. neutral	27.5

WAX

Mid-Continent

132-134 A.M.P.	6.0

THE lack of strength in the light-heating-oil market on the East Coast resulted in the loss of better than half of the increase that was posted following the raise in crude prices.

Esso Standard Oil Co. announced a reduction of 0.35 cent a gallon in tank-car prices of kerosine and distillate fuels for most of its marketing area in the north central portion of the East Coast. Tank-wagon prices were reduced 0.30 cent a gallon for these areas, the difference representing an increase in the distributor's margin. The new barge price for No. 2 fuel in New York Harbor is based on a reduction of 0.35 cent from the last posting of 10.25 cents a gallon. The new posting of 9.9 cents is subject to the 0.5 cent summer discount to give a net of 9.4 cents.

Some material is still offered at the old price of 9.15 cents, posted for New York Harbor before the increase, despite official postings of 9.4 cents for No. 2 fuel by most suppliers. The market has not stabilized enough to tell if prices will end up at the new revised level or will drop back to the old net 9.15 cents for No. 2.

Most of the activity in the Mid-Continent distillate market has been confined to contracts.

Gasoline movement in the Mid-Continent and North Central areas has been generally good, but a few suppliers reported that movement since the first of July has been a little less than the volume expected.

Some of the renewed firmness of the residual market for Group 3 refiners may be due to larger-than-normal movement of heavy ends as road oil.

Tanker rates continue at very low levels. Spot rates for dirty vessels in the coastwise trade are reported to be at 45 per cent under the Maritime Commission base. The rate for residual moving from the Gulf Coast to points north of Hatteras is slightly less than 25 cents a barrel.

CRUDE PRICES GRAVITY SCHEDULE

	Signal Hill, Calif.*	Oklahoma, Kansas	Gulf Coast Tex.†	West Tex.‡
14-14.9	$1.87			
15-15.9	1.93			
16-16.9	1.99			
17-17.9	2.05			
18-18.9	2.11			
19-19.9	2.18			
20-20.9	2.24	$2.50		$2.37
21-21.9	2.30	2.52		2.39
22-22.9	2.37	2.54		2.41
23-23.9	2.45	2.56		2.43
24-24.9	2.53	2.58	$2.91	2.45
25-25.9	2.61	2.60	2.93	2.47
26-26.9	2.69	2.62	2.95	2.49
27-27.9	2.76	2.64	2.97	2.51
28-28.9	2.83	2.66	2.99	2.53
29-29.9	2.91	2.68	3.01	2.55
30-30.9	2.97	2.70	3.03	2.57
31-31.9	3.04	2.72	3.05	2.59
32-32.9	3.12	2.74	3.07	2.61
33-33.9		2.76	3.09	2.63
34-34.9		2.78	3.11	2.65
35-35.9		2.80	3.13	2.67
36-36.9		2.82	3.15	2.69
37-37.9		2.84	3.17	2.71
38-38.9		2.86	3.19	2.73
39-39.9		2.88	3.21	2.75
40 and above		2.90	3.23	2.77

*Standard Oil Co. of California. †Upper Texas Gulf Coast. ‡Includes New Mexico Permian.

Prices East of California effective June 15, 1953. California prices effective February 16, 1953.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

Louisiana:	
Cotton Valley (distillate)	$3.00
Cotton Valley (Holloway crude)	2.95
Texas:	
East Texas	2.90
Chapel Hill	2.83
Conroe	3.13
Van	2.73
Pennsylvania Grade:	
Bradford	4.40
Southwest Pennsylvania	3.97
West Virginia	3.91
Illinois Basin	3.02

Your MARKET PLACE FOR THE OIL AND GAS INDUSTRY... CLASSIFIED ADVERTISING

UNDISPLAYED CLASSIFIED 20c a word one issue. 10% Discount three or more consecutive issues. $4.00 minimum charge. Blind Box in our care nine words. Payable in Advance.

DISPLAY CLASSIFIED
$14.00 a column inch one issue . . . 10% Discount three or more issues.

Address Classified Advertising Material: The Oil and Gas Journal, P. O. Box 1260, Tulsa 1, Okla.

EQUIPMENT FOR SALE

FOR SALE: 10,000′—4½″ drill pipe, with tool joints cut off, located at Hobbs, New Mexico. Makin Drilling Company, Box 1628, Hobbs, New Mexico.

FOR SALE

SUPERIOR HEAVY DUTY DIESEL

510 hp. at 360 r.p.m.—5 cylinder—14½x18 type ZDSB — non-reversing — vertical—4 cycle—cold starting—mechanical injection. Engine is totally enclosed. Complete with a 48" 7 groove V-belt sheave and new spare parts. For heavy duty pumping, dredge service, power generation, textile and saw mills, mining, etc. EXCELLENT CONDITION, IMMEDIATE DELIVERY.

G. M. 3-71 DIESEL GEN. SET

30 kw. 2 cylinder 4½x5 diesel—radiator cooled—electric starting. Delco 3/60/440 generator — with switchgear. Skid mounted. Portable.

30 KW SHEPPARD DIESEL SETS

30 kw. Sheppard—115 volts DC—radiator cooled. Built 1950. Excellent condition. Self-mounted radiator and fuel tank. 16 units available.

75 KW WAUKESHA DIESEL GENERATOR SET

75 kw.—230 volts DC—totally enclosed, self-contained. Waukesha 6 cyl., 160 hp., 1200 r.p.m. diesel driving 75 kw. 1200 r.p.m. G. M. marine type generator. Self-contained switchboard and radiator.

100 KW G. M. 3-268A A.C. DIESEL GENERATOR SETS

440 volts—3 phase—60 cycle. 20 kw. D.C. generator on same shaft—5 kw. exciter—120 volts D.C.—electric starting.

LORIMER SLOW SPEED 100 KW A.C. DIESEL GENERATOR SET

Slow speed heavy duty unit. 150 hp.—5 cyl.—4 cycle—720 r.p.m.—electric starting—Ross heat exchanger—engine operating panel. Allis-Chalmers generator—100 kw. — 440/3/60 — 80% PF — cubicle deadfront switchgear. Can quote with radiator if desired.

300 KW G. M. D.C. DIESEL SET

ENGINE: G.M. 8-268A—6½x7—1200 r.p.m. —air starting. GENERATOR: 300 kw. G.E.—120/240 volts D.C.—3 wire—totally enclosed—Marine type BB—with switchgear.

ELECTRIC WINCHES

Single drum—50 hp. 230 volt D.C. motors —built-in controls.

STEAM TURBO GENERATOR SETS

300 kw—120/240 volts D.C.—1200 r.p.m. —1250 amps.—turbine W.P., 225 lbs. to 440 lbs.

MARINE SURFACE CONDENSERS

1050 sq. ft.—3000 sq. ft.

THE BOSTON METALS CO.
313 E. BALTIMORE ST.
BALTIMORE 2, MARYLAND
CURTIS 7-5050

EQUIPMENT FOR SALE

ONE COMPLETE GM Quad in good running condition. Recently overhauled. 60 injectors. $3,800 FOB Seattle. Evans Engine & Equipment Co., 1230 Westlake North, Seattle.

FOR SALE: Bettis 40 hp. steamer and equipment. Arnold E. Fox, 4756 North Seneca, Wichita, Kansas.

FOR SALE: In Oklahoma three single Reduction Gear Units, one Type 50 Lufkin, one National H-60 and one National H-6. Cities Service Oil Co., Patridge, Bartlesville, Okla.

FOR SALE: 1951 Cessna 195: 245 HP; 400 total hours; Cross-wind Gear; VHF; OMNI; Gyros; Hangared; Brand new condition; one owner; $12,500.00; write Box G-582, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: 60,000 4½ o.d. s.s. line, 60,000 3½ o.d. line all new. 5—55,000 bbl. tanks. 5—10,000 and 5—5,000 tanks. Lundquist Pipe & Supply Co. Phone 5-8850, Tulsa, Okla. P. O. Box 1215.

CHARTER OR SALE

"MYRNALYNN"

136′ x 24.5′ x 8.5′—1000 H.P. Twin Diesel

LOCATED NEAR HOUSTON

COASTAL SHIPPING COMPANY, INC.
P. O. Box 4293, Beaumont, Texas

Large Diameter

NEW STEEL PIPE

24″ O.D. .281 wall 6,000 feet
26″ O.D. .281 wall 2,400 feet
28″ O.D. .281 wall 8,000 feet
30″ O.D. .500 wall 5,000 feet

All 40 foot lengths

Small size pipe and tubing also available.

Attractively Priced
For Immediate Shipment

Submit your requirements

Write—Wire—Phone

SONKEN-GALAMBA CORPORATION
2nd and Riverview (X-960)
Kansas City 18, Kansas
ATwater 9305

EQUIPMENT FOR SALE

NEW LEE C. MOORE 100′ Cantilever Mast for sale. 18′ x 40′ 9″ base. 510,000#. Herman Graham Drilling Co., Salem, Ill.

1000′—14″ OD x 119 lbs. per ft. x 20′ random length, H. R. seamless steel tubing. Box G-562, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: 1 Farrel-Birmingham Type SI-148 Speed Increaser, right-hand assembly. Top Spray, 300 HP, 900 to 3623 RPM, 4.025:1 Ratio, Cooler and Pump Assembly—New. Price $3,000 f.o.b. Oklahoma City. Address inquiry George Gentry, Room 546 Adams Building, Phillips Petroleum Company, Bartlesville, Oklahoma.

HYDRAULIC Casing Pulling Machine. This rig has been used only two (2) months, and is very attractively priced. Contact C. E. Knight, Box 1688, Snyder, Texas. Ph. 3-6646.

FOR SALE: Type 80 Cooper gas compressors. Good condition. Alfred B. Kern, 223 Wright Building, Tulsa, Oklahoma.

4000′ BRAND NEW National 3½″ drill pipe—30c per foot off list. 2 LROU Waukeshas, skid mounted, with V-belt power take-offs, one perfect, one needs overhaul—$8000 for both. 1 WAK Waukesha, skid mounted, with new torque converter—$2500. 7P Wilson Snyder pump, completely overhauled, $5000. SW&H Drilling Company, Box 664, Midland, Tex. Phone 22111

2100′ 10¾″ OD 31.20# A-53 New Smls Pipe PE SRL.
600′ 8⅝″ OD 24.70# Ditto
500′ 5⅝″ OD 14.62# Ditto
900′ 10¾ OD 40.48# A-53 New LW Pipe PE SRL

Pipe is National and Spang located at Wichita.

FRANK MORRIS AND COMPANY
424 South Cheyenne St., Tulsa, Oklahoma
Telephone 2-6247

5—55,000 bbl., 1—25,000 bbl., 10—10,000 bbl., 4—5,000 bbl. tanks, all standard specifications, all steel roofs, all bottoms thoroughly cleaned, located Wichita, Kansas, sell standing or cut down, loaded on cars.

50,000 ft.—6⅝″ OD, Schedule 40, seamless, 18.97 weight line pipe, cleaned, beveled and primed, 80% Range 2, 20% Range 1, guaranteed same as new every respect, located Cleveland, Oklahoma.

Ph. 3-6141 W. C. BERRY Box 1858 Tulsa

FOR SALE
DIESELS AND PUMPS

Two new 1947 unused 475 BHP 5 cylinder Baldwin Model VG Diesel Engines, each connected to Worthington Horizontal Triplex Double Acting Pump, both units with Falk Couplings and other accessories. Location Ohio, immediate delivery. Direct inquiries to

THE BUCKEYE PIPE LINE CO.
Joseph Steele, Purchasing Agent
Room 2200, 30 Broad St.
New York 4, N. Y.

EQUIPMENT FOR SALE

FOR SALE: 1 Wilson Atlas Draw Works, Serial #6245. 2 G.A.K. Waukesha engines, completely overhauled with all new parts. A-1 condition. Makin Drilling Company, Box No. 1628, Phone 3-3141, Hobbs, New Mexico.

FOR SALE: Sullivan "300-A" Trailer mounted drilling rig. Powered with 2 Buda engines, double derrick, 7¼x10 pump, swivel, kelly, light plant. Complete rig less drill pipe. Excellent condition. For inventory and price write Box 1022, Del Rio, Texas, or Phone 813.

EVERYTHING in new and used equipment for well drilling. Fishing tools rented. Save money, get quotations from Pressey & Son, Pueblo, Colorado.

36L BUCYRUS-ERIE Spudder used OS with practically new L525 Buda Engine. Located Shidler, Oklahoma. Contact Wayne King at Shidler or Buckeye Supply Co., El Dorado, Kansas.

SALES and rentals of cable drilling and fishing tools, casing and equipment from the Southwest's largest stock of used cable tools and oil field supplies. Degen Pipe and Supply Co., Tulsa, Oklahoma

FOR SALE: U-15 perfect condition. Wonderful buy available only because of health. Cummins L1-600 Engines, Gardner-Denver 16" Pump, 7000' nearly new 4½" Drill Pipe, 16 Drill Collars, 10' Sub-Structure, Steel Floor, Dog House, Change House, Necessary Tools, including Trailer House. If interested in good Rig ready to go, Investigate. Box G-573, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE—1949 NAVION

Excellent condition, executive use only, always hangared, no brokers. For additional information contact

H. D. SMALLEY
304 Delaware St., Tel. Victor 2050
Kansas City, Mo.

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 20-25-50 KW Generating Units

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

USED LINE PIPE FOR SALE

17 miles 10¾" OD Electric Weld 28.04# PE BFW. Approx. length 37'. 51 miles 8⅝" OD Seamless 23.57# PE BFW. Approx. length 35'. 10 miles 6⅝" OD Seamless 17.02# PE BFW. Approx. length 35'. We consider the above first-class merchandise.

BETHLEHEM SUPPLY CO.
Box 2171, Tulsa, Oklahoma
PHONE 5-9261, Ext. 361

FOR SALE

New and Used material—Immediate delivery from stock, Angles, Channels, I and WF Beams, especially for construction needs.

H BEAMS PILE SECTIONS

Phone or Wire your steel requirements.

We are also interested in purchasing your surplus material. We assure you our prices will be the best obtainable.

CARSAND STEEL CORP.
14-23 34th Avenue
Astoria, New York
Astoria 8-4484 8-8023

EQUIPMENT FOR SALE

16,000' of 8⅝" OD, 28# & 32# 7,500' of 10¾" OD, 32.75# 7" OD 20#, 23# & N80. All above casing new. 15,000' of 3½" Mod. Drill Pipe. Chapman Pipe & Supply, Box 4232, Ph. ME-81567, Okla. City, Okla.

TWO—Cooper-Bessemer Gas Engines 16"-x20"—165 HP at 180 RPM. Enclosed Case—Two cycle. Two—Farrell-Birmingham Speed Transformers Type SS-1—Size 24-12-200 HP—200 to 2000 RPM. Two—Byron Jackson Centrifugal Pumps. Size 300 GPM Six stage 2000 RPM Head 1560. Equipment second hand in good condition. Spare parts—new. Detroit Southern Pipe Line Co., Hamtramck 12, Michigan.

FOR SALE: 7500' 4½" 16.60# Sonoscoped Drill Pipe 4500' 3½" 13.30# Reg. Drill Pipe. 1—6" x 41' Square Kelly, Rotary, Cable Tool and production equipment. Giffin & Thompson Supply, Hoisington, Kansas. Phone 477.

FOR SALE: Drilling Unit Failing Model 500, including drill pipe and tools mounted on International KB7 truck. Basanda Construction Company, 2925 Northwest 39th Terrace, Oklahoma City, Oklahoma. Phone WI. 3-3326.

AIR ELIMINATORS. All working parts stainless steel or brass. Used on gravity lines, pumps. Automatic, positive acting. McCunningham Mfg. Co., Box 477, Sedan, Kansas.

FOR SALE: 2— Drilling rigs, 5,000' capacity. Franks S.A.L. 5000, with 96' Franks derrick, 3½" drill pipe, now drilling in West Texas. Franks double drum draw works, Lee C. Moore derrick, 4½" drill pipe, drilling in South Texas. Both rigs complete with all equipment. For inventory and price write Box 1022, Del Rio, Texas, or Phone 813.

DIRECT CURRENT motors; complete range of sizes ¼ to 10 H.P. priced to move. 1320 W. 19th, 4-3123, Tulsa.

EQUIPMENT WANTED

—WANTED: Three used 12 cylinder RXIVW LeRoi engines, in good condition, at a bargain. Makin Drilling Company, P.O. Box 1628, Hobbs, New Mexico. Phone 3-3141.

WILL PAY highest prices for used casing, used line pipe, abandoned leases, or other surplus lease equipment. Your idle producing equipment is worth dollars. Green Pipe & Supply Co., Box 1383, Tulsa, Oklahoma.

NOTICE: We buy, We sell equipment everywhere. If you want to sell or buy, contact Pressey & Son, Pueblo, Colorado.

WANTED TO BUY: Used Proportioneers blending equipment or other asphalt blending equipment. The Somerset Refinery, Box 631, Somerset, Kentucky.

REAL ESTATE

FOR LEASE: Attractive, conveniently arranged brick office building, 80' x 34', in downtown Odessa, Texas. Excellent office space for oil company, independent oil operators, equipment company or drilling contractors. For information write Wilson Estate, Box 485, Odessa, Texas, or Telephone 6-6242.

COLORADO RESORT PROPERTY FOR SALE

If you have two Cadillacs you can rub together and can afford the most beautiful place in all the Rocky Mountains, write E. E. Waller, Evergreen, Colorado. This is the outstanding location in this beautiful, pine studded section of Colorado. Three room "Dream Cottage" complete, with five room Mt. Vernon house ¾ complete on 7½ secluded acres. We only have two Buicks and can't afford to finish it.

PRODUCTION SERVICE

GETTING MORE oil and more pay. Other methods used with our Geochemical. Iroco Laboratory, PO Box 630, Stillwater, Oklahoma.

RANCHES AND FARM LANDS

FOR SALE: Several good ranches in South Dakota, some well improved. Open water and stock dams. Fenced. Plenty of feed and hay. 1000 to 10,000 acres priced $16.00 to $30.00 per acre. Immediate possession. Terms if desired. Address C. H. Mork, Lemmon, South Dakota.

HELP WANTED

OIL Industry Employment Service, 405 Tuloma Bldg., Tulsa, Okla. 4-5974. Tom Robinson, owner. For Technical and Trained Personnel, including LPG.

SALES ENGINEER: Familiar with design and sale of gas process equipment—gasoline plants. Box G-549, The Oil and Gas Journal, Tulsa, Oklahoma.

PROCESS ENGINEERS

Engineering contractor has openings which offer excellent opportunities for young Process Engineers with background in chemical, refining, or gas & gasoline industries, for permanent position in office located in Tulsa, Oklahoma. One to five years experience is desirable but college education & willingness to assume responsibility are essential. Applicants should write giving age, resume of experience, education and salary expected. Please address Box G-519, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEERS

FOREIGN SERVICE

Graduate engineers with good background in general physics, mathematics, mechanics and with some laboratory experience in equipment and techniques. For laboratory position responsible for theoretical experimental studies on reservoir fluid and rocks. Duties will consist of designing equipment, performing or supervising, testing and analyzing and reporting results. Studies pertinent to evaluation of primary depletion practices and applicability of secondary recovery for pressure maintenance operation will be required.

Please write giving full particulars regarding personal history and work experience. Please include telephone number.

RECRUITING SUPERVISOR
BOX OG-5
Arabian-American Oil Company
505 Park Avenue
New York 22, N. Y.

LARGE INDEPENDENT OIL CORPORATION

...has openings for three junior engineers who are interested in refining operations. Location of employment will be in large central Oklahoma refinery in a new technical service that is being developed.

These positions involve technical service work in crude distillation; catalytic cracking; gas recovery; polymerization; H-F Alkylation; and delayed coking.

Applicants must be refining, mechanical, or chemical engineering graduates. These are permanent positions with a young, progressive company and offer excellent opportunity for experience and for advancement in an expanding organization. Give details of experience and salary expected.

Box G-567, The Oil and Gas Journal,
Tulsa, Oklahoma

HELP WANTED

WANTED: Experienced Safety Engineer, for oilwell drilling contractor, with nine (9) rotary rigs operating in West Texas and Southeast New Mexico area. In applying, give age, references, and experience. Reply Box G-496, The Oil and Gas Journal, Tulsa, Oklahoma.

FOREIGN EMPLOYMENT. List of oil companies and drilling contractors showing where to apply for foreign jobs. OIML Co., Box 2603, Tulsa, Okla. $5.00 cash.

WANTED: Petroleum or Mechanical Engineers for oil tool design. Field experience desirable. State age, education, experience and salary expected. Box G-556, The Oil and Gas Journal, Tulsa, Oklahoma.

DESIGN ENGINEER: Mechanical Design Engineer with 5 to 8 years experience in design of drilling equipment — specifically draw works, rotary tables, and masts. Progressive expanding company, excellent working conditions and benefits. Salary commensurate with experience. REYNOLDS METALS COMPANY, 2000 S. Ninth Street, Louisville, Kentucky.

CHEMICAL ENGINEER
or
CHEMIST

Major Oil Company operating in Venezuela has opening in Production laboratory for Chemical Engineer or Chemist with experience in operation of Podbielniak Column; preferably low temperature Hyd-Robot type. . . .

Experience in operation P.V.T. equipment desirable but not essential.

P. O. BOX #35
Bowling Green Station
New York 4, N. Y.

ESTIMATORS

Young engineers capable of mechanical estimating for construction of refineries, steam power and similar industrial projects. Must have some field experience. Considerable weight given to ambition, intelligence and interest in estimating and cost analysis.

BECHTEL CORPORATION
220 Bush Street
San Francisco, California

PETROLEUM ENGINEER

as Chief Officer of newly created Montana Commission. Must be thoroughly versed in subsurface geology, production practices, reservoir studies, and be able to supervise field inspectors and manage business of Commission. Dependability and integrity are prime factors. Applicants write full details to Commission for consideration at mid-July meeting.

OIL AND GAS CONSERVATION COMMISSION OF THE STATE OF MONTANA
Box 1122, Great Falls, Montana

ELECTRICAL CONTRACTORS

Office Phone 5-5315 — **Res. Phone** 7-4950

W. L. RATCLIFF COMPANY
ELECTRICAL CONTRACTORS
Industrial—Commercial—Distribution
W. L. Ratcliff — **506 Caddo St.**
P. O. Box 373 — **Shreveport, La.**

SITUATIONS WANTED

OFFICE MANAGER, Controller, Executive Assistant desires responsible supervisory position with growing oil company. Rocky Mountain Area preferred. Presently employed by oil refinery on West Coast. Six years extensive experience with emphasis on public and personnel relations with this company. Accounting background. Age 31. Married. Box G-532, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES ENGINEER—Petroleum Engineering graduate, Texas A. & M. College, Age 35. Over seven years with one company, four years as Sales Engineer of highly specialized oil field equipment. Looking for opportunity with manufacturer or distributor of basic products. Southwestern location desired. Box G-575, The Oil and Gas Journal, Tulsa, Oklahoma.

GRADUATE geologist, 2 years experience, desires position with future. Any location acceptable. Box G-584, The Oil and Gas Journal, Tulsa, Oklahoma.

LANDMAN: Thoroughly experienced and trained all phases field operations and office procedures major company land department. Presently assigned to field. College and legal background. Licensed attorney. Location optional. Extensive travel satisfactory. Box G-569, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEER: B.S. in EE. Age 44, married. Twelve years experience with major oil company in drilling, production, and natural gasoline; three years hydraulic engineering in own business. Desires production engineering position. Write Box G-580, The Oil and Gas Journal, Tulsa, Oklahoma.

REFINERY SUPERVISOR AVAILABLE. Chemical Engineer, 12 years diversified experience modern refinery processing and operations supervision desires responsible supervisory position in refining or petrochemical field. Experience includes process planning attendant plant expansion, training personnel and operation supervision bring new units up, plant balance and economic studies, and responsible supervision complete refinery activities. Box G-577, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL ENGINEER: 8½ years diversified experience in refinery operations and process design with major. Desire position with small independent or engineering firm in South Texas area. Box G-555, The Oil and Gas Journal, Tulsa, Oklahoma.

EXECUTIVE: Division Superintendent in charge of drilling and production for large operator in West Texas. Twenty years diversified experience in field operations and management. Available September 1st. Box G-558, The Oil and Gas Journal, Tulsa, Oklahoma.

PIPING DESIGNER, with 15 years diversified refinery & petrochemical plant design experience. Have supervisory background for drawing room or project engineering assignments. Box G-560, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No 1628. Ph. No. 3-3141, Hobbs, New Mexico.

CONTROLLER, Treasurer, Office Manager, Department Head desires responsible supervisory or administrative position with oil or gas company or service organization. 25 years extensive, diversified experience, domestic and foreign, with major oil companies, including producing, refining and marketing. Accounting and tax background. Widely traveled; speaks Spanish and French. Mature, poised and used to responsibilities. Presently employed in managerial capacity. Highest references. Middle forties; married. Will re-locate. Box G-561, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED ENGINEER
With 12 years in industry desires new position in Texas or Oklahoma. Familiar with all phases of natural gas, gasoline plant design and operation, maintenance and evaluation. Available immediately. Box G-578, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

ENGINEER: Age 24, married. B.S. in E.E. 30 hours on M.S. I.E. One year experience. Prefer Mid-Continent or Southwest. Box G-559, The Oil and Gas Journal, Tulsa, Oklahoma.

LAND man experienced in securing easements, paying damages and handling other allied problems with minimum supervision. Permanent position. Box 3, Lake Zurich, Illinois.

GEOLOGIST: 32, married, 4½ years experience in West Texas with major desires change with large independent in Rocky Mountain Region. Box G-579, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST: 7 years experience in all phases petroleum exploration and exploitation, age 34, excellent physical condition. Desires foreign employment on either salary or retainer basis. Prefer South America or Canada. Box G-583, The Oil and Gas Journal, Tulsa, Oklahoma.

RESERVOIR Evaluation Engineer, 34, single. Employed by major. Desires position with independent. Seven years office and field experience. Box G-574, The Oil and Gas Journal, Tulsa, Oklahoma.

LEASE AND DRILLING BLOCKS

SEE A. L. Bowles, Rollow Building, Ada, Oklahoma, for drilling deals.

NEBRASKA — SALINA BASIN: Drilling Blocks, Geology and Shot information. Farm outs or will sell part and drill well. Box G-581, The Oil and Gas Journal, Tulsa, Oklahoma.

WILL pay cash instantly for leases (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2153, Denver, Colorado.

BLOCK of leases in Kay County, Oklahoma, near producing wells, for drilling operations. Full particulars write George Jacques, Uncas, Okla.

OFFER Farmout 732 acres in Sections 1, 11 and 14 159N-95W Williams County, North Dakota. No cash consideration. Override only. Well must be commenced by August 1, '53. Call 2962 Redwood Falls, Minn.

I OFFER 4000 acres oil and gas leases in San Saba County, Texas, low price for quick sale. Write for full details. John Stouppas, 175 E. Long St., Columbus, Ohio.

7 MILLION FOOT GAS WELL for sale at price that will pay money back in 12 months. Located about 30 miles from famous Monroe Gas Field . . . Several other gas wells within 2 to 3 miles producing from 3 to 20 Million Feet . . . My well open flow recent La. Conservation Comm. test 7,400,000 cu. ft. . . . Rock pressure 861 lbs. . . . Allowable for wells this area 20% of open flow . . . Market price 9c per 1000 ft. . . . Spacing set at 1 well to 40 acres . . . Company purchasing gas will look after and operate well at minimum cost. I am going to sell this well and 40 acres for $24,000. I expect to lay pipe line to market 3 miles away immediately. Opportunity to participate in development of large tract. If you are interested, whether to a large or small extent, in helping develop an area where approximately 2000 ft. gas wells produce and run their allowable for many, many years, and where oil is in prospect at 2400 feet, immediately contact: C. E. Simmons, P.O. Box 270, Winnfield, Louisiana. Ph. 3311.

LEASES ROYALTIES
Producing and Nonproducing
Bought and Sold—Any Area
Inquiries Invited
B. D. BUCKLEY
6635 Delmar Ave., St. Louis 5, Mo.

A NEW OIL FIELD—SE NEW MEXICO
As recommended 1st well drilled on D. S. Test showed for 20 b.p.h. Three other fields of like importance to be drilled. Engineering data furnished investors these important areas gratis.
W. J. PETERMAN, Geologist
1918—1953
Portales, New Mexico

LEASE AND DRILLING BLOCKS

FOR SALE: 10,000 acres 10 year Oil and Gas Leases in Kentucky. 10c per acre rental. Write—Harvey Daugherty, Horse Branch, Kentucky.

ROYALTIES

WE WILL BUY producing or non-producing oil royalties. Standard Security Company, 111 Broadway, New York 6, N. Y.

PRINCIPAL will buy $100,000.00 to $200,000.00 worth of oil (or gas) royalties that are developed. Will purchase direct from owners or through authorized broker. Prefer a group of interests in several areas. Send 1952 and 1953 income by months. Box G-552, The Oil and Gas Journal, Tulsa, Oklahoma.

IN ELK CITY FIELD, offering royalties ahead of the drill, conditional guarantee with sale, contact owner: A. S. Berry, P. O. Box 1383, Tulsa, Okla.

PRODUCING ROYALTY and overrides for sale. Wire-write-call for particulars JACK EAGLE, 706 City Natl. Bldg., Okla City, Okla. REgent 6-7027.

GET TOGETHER: Both Capital and Royalties are available. If the investment proposition you want isn't listed in this column use a Journal classified advertisement to find it. See box heading for classified rates or write The Oil and Gas Journal.

ROYALTIES WANTED
Producing Royalties
High Grade Only
Send Full Particulars
Address
C. C. HARMON
719 World Bldg., Tulsa, Okla
P.O. Box 2151

OFFICE BUILDING FOR RENT

OFFICE BLDG., Denver, Colo. 6600 sq. ft. of floor space in very attractive downtown office bldg. Full finished basement. Fronts on 2 downtown streets. Attractive flash brick, fire-proof bldg. Available October 1st., at lowest rental rate in downtown Denver. 10 year lease available. Jack Wehner Real Estate, 4522 E. Colfax Ave., Denver, Colo. Phone DExter 1511.

EQUIPMENT MEN

BS&B Names Unsell Denver District Sales Manager

DEE UNSELL

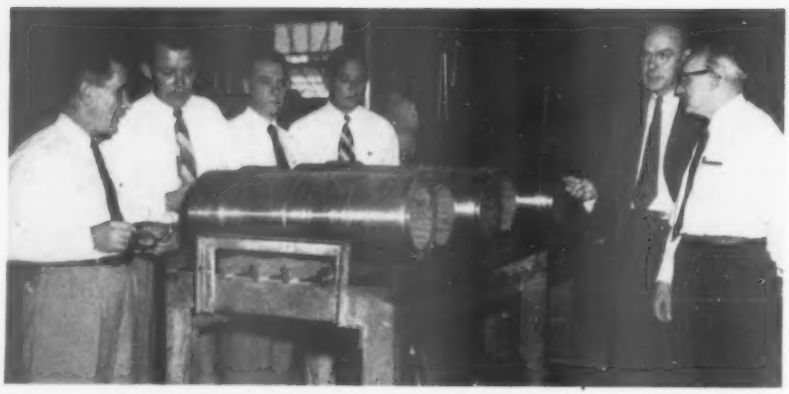
Lawton L. Laurence, manager, oil-field sales, Black, Sivalls & Bryson, Inc., has announced the appointment of Dee Unsell as Denver district sales manager.

Unsell has been with BS&B for the past 13 years. During that time he has served BS&B as salesman and city sales manager at Denver. In his new capacity, Unsell has supervision of sales and service activities of the oil-field division in the Denver sales district.

Reishus Made Industrial Power Vice President

Harold T. Reishus, who has been general manager of the Industrial Power Division, International Harvester Co., since its formation in 1944, has been elected vice president in charge of the division, according to John L. McCaffrey, International Harvester president.

Reishus started his service with International Harvester in 1923 and in the intervening years advanced through various managerial positions in the farm-equipment and motor-truck divisions. In 1941 he was apointed eastern regional manager of sales; in 1942 was assigned to the war-materials department, and in 1943 he was named assistant domestic sales manager of industrial equipment.



Royal Dutch Representatives Visit Mission Plant

Representatives of The Royal Dutch Oil Co. from The Hague were given a personally conducted tour through the Mission Manufacturing Co. plant on their recent visit to Houston. These men are making an extensive trip through oil-industry centers. Prior to coming to Houston they visited West Texas, and attended the International Petroleum Exposition at Tulsa. Looking over some unfinished forgings of Mission mud pump liners are, left to right: J. M. Russell; Fritz W. Haeseker; H. W. Lafeber; Jack Stewart, Mission representative; Dudley C. Sharp, president of Mission; and A. Gorkovol.

Security Engineering Names Roland Gillett

R. R. GILLETT

A. M. Birnie, general sales manager for Security Engineering Division, announced appointment of Roland Gillett as administrative assistant.

Gillett first joined Security in 1948 in Whittier, Calif., where he worked in cost-accounting department. Subsequently he was placed in charge of inventory control. In 1950, Gillett was promoted to office manager of the Odessa, Tex., office.

In 1952 Gillett left Security to join Welex Jet Service, Inc., a post he held until his recent return to Security to assume his new job as administrative assistant to general sales manager.

Reed Adds Flash Weld Shop To Houston Facilities

A 43,000-sq. ft. addition to Reed Roller Bit Co.'s Houston plant has recently been completed. The new shop will flash weld tool joints to drill pipe, latest addition to Reed's line of oil tools.

Reed Roller Bit salesmen inspecting a newly welded Reed tool joint, flash welded to drill pipe are: W. L. Childs, sales manager; R. G. Hamaker, vice president in charge of sales; and Mario Cueto, special sales representative in South America.

More than 50 Reed division managers and salesmen from all over the United States, Canada, Mexico, and South America, were brought to Houston for a 3-day session to inspect the new plant and watch it in operation.

At a cost in excess of half a million dollars and after extensive experimentation and metallurgical research, Reed engineers and technicians have perfected their process for flash welding tool joints to drill pipe. The flash-produced

weld is so strong that when strength tested to the point of destruction, resulting breaks consistently occurred outside the weld area and in the drill pipe itself. Designed by Reed engineers, the pipe-handling system collects and feeds drill pipe into the welding machine, moving the 600-lb. lengths around without workers having to touch them.

Welding is accomplished by a Swift Special flash-welding machine. Specially designed for this job, it weighs nearly 60 tons and is as big as a two-car garage.

Johnston is Vice President Of Brown Fintube Co.

L. C. JOHNSTON

John W. Brown, Jr., president Brown Fintube Co., Elyria, Ohio, has announced the appointment of Laurence C. Johnston as vice president. Johnston will continue to manage sales of heat exchangers and all other Brown Fintube heat-transfer equipment in the eastern territory, with offices in New York City.

Johnston joined Brown Fintube Co. as eastern district sales manager in 1949, after service with Process Engineering, Inc., and Patterson-Kelley Co. He graduated from University of Michigan in 1930 in mechanical engineering.

New Staff at Midwest Piping Chicago Office

Louis H. Niebling, formerly director of controlled materials in Midwest Piping Co.'s home office in St. Louis, has been made manager of Midwest's Chicago district sales office, according to announcement by A. G. Stoughton, president.

Niebling has been with Midwest since his graduation as a mechanical engineer from Washington University in 1928. He became manager of the oil department in 1937; then manager of the engineering-order department where he remained until 1950 except for 4 years in military service. In 1950 he was made manager of Midwest's material-control department and director of controlled materials in 1951.

Stoughton also announced that Walter Janesch has been made assistant to Niebling in the Chicago office. Janesch came to Midwest as traffic manager in 1943. In 1949 he was made district sales representative, working out of the St. Louis office.

ADVERTISERS IN THIS ISSUE

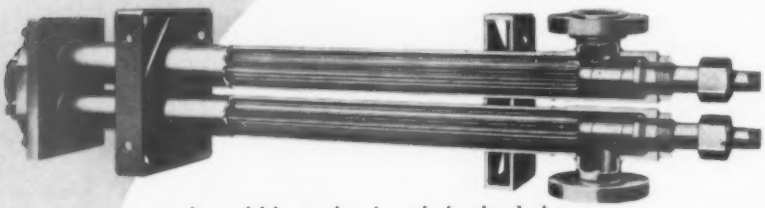
Allis-Chalmers Mfg. Co. 159
Alloy Steel Products Co., Inc. 112
Alten Foundry & Machine Works 187
Aluminum Co. of America 130
American Hoist & Derrick Co. 112
American Manufacturing Co. of Texas 4
Ampco Metal, Inc. 169
Armco Drainage & Metal Products, Inc. 92
Autocar Company, The 13
Baird Mfg. Co. 184
Baker Oil Tools, Inc. 70
Beaird Company, Inc., The J. B. 53, 54
Bendix Aviation Corporation 12
Brodie Co., Inc., Ralph N. 162
Brown & Root, Inc. 68
Bucyrus-Erie Co. 28
Byron Jackson Co. Front Cover
Cameron Iron Works, Inc. Inside Front Cover
Cast Iron Pipe Research Association, The 151
Chain Belt Co. 18
Chicago Bridge & Iron Company 91
Chrysler Corp., Dodge Division 6
Classified Advertising 201, 202, 203, 204
Cleveland Worm & Gear Co., The 22
Colorado Fuel and Iron Corp., Wickwire Spencer Steel Division 139
Construction Machinery Companies 182
Continental Supply Co., The 189, 190
Crose Manufacturing Co., Inc. M. J. 169
Cummins Engine Co., Inc. 8
Darling Valve and Mfg. Co. 50
Dean Brothers Pumps, Inc. 151
del Lago Hotel 15
Diamond Chain Company, Inc. 176
Dowell Incorporated 72
Drilling & Service, Inc. 186
Duff-Norton Mfg. Co. 35
du Pont 103, 104
Eastman Chemical Products, Inc. 29
Elliott Company 44
Empire Trust Company 181
Emsco Manufacturing Company 189, 190
Fairbanks, Morse & Co. 2
First National Bank & Trust Co. of Tulsa, The 175
Flint Steel Corporation 173
Fluid Packed Pump Company 19, 20
Fluor Corporation, Ltd., The 39
Foxboro Company, The 48
General American Transportation Corporation 106
General Descaling Co., Ltd. 168
Geolograph Company, Inc., The 181
Glitsch & Sons, Inc., Fritz W. 109
Grancell, I. H. 174
Grinnell Company, Inc. 3
Griscom-Russell Co., The 206
Grove Regulator Co. 133
Guiberson Corporation 61
Halliburton Oil Well Cementing Co. 17, 30
Harnischfeger Corp. 16, 154, 155
Helicoid Gage Division, American Chain & Cable Co. 153
Hewitt Rubber Division, Hewitt-Robins, Incorporated 45
Houston Contracting Company, Ltd. 167
Hudson Engineering Corporation 122
Huey & Co., S. E. 168
Hughes Tool Co. Back Cover
Inferno Co., The 174, 184
Intercontinental Hotels Corporation 15
International Harvester Co. 110
International Nickel Company, Inc., The 14
Jacobson, E. C. 168
Johnston & Jennings Company, The, Division of Pettibone Mulliken Corporation 64
Jones & Laughlin Steel Corporation Supply Division 25
Kelley Manufacturing Company 137
Kemp Mfg. Co., C. M. 62
Kennametal, Inc. 32
Kinzbach Tool Co., Inc. 130
Koch Engineering Company, Inc., The 7
Lane Plating Works 185
Lane-Wells Company 27, 185
Larkin Packer Company, Inc. 144
Lonergan Co., J. E. 167
Lunkenheimer Co., The 65
Magnet Cove Barium Corp. 115
Manco Mfg. Co. 169
Manning, Maxwell & Moore, Inc. 52
Marquette Metal Products Co., The 34
Martin, Manufacturer, John N. 113
McCullough Tool Company 127
McKee & Co., Arthur G. 170
Medical Supply Company 64, 112
Mercantile National Bank at Dallas 24
Metal Goods Corporation 21
Minneapolis-Honeywell Regulator Co., Industrial Division 142
Mission Mfg. Company 56, 57
Monsanto Chemical Company 136
National Airoil Burner Co., The 172
National Bank of Commerce of Houston, The 119
National Petro-Chemicals Corp. 140
National Supply Co., The 36, 37
Nelson Electric Mfg. Co. 126
Nordstrom Valve Division, Rockwell Manufacturing Company 40, 41
Oil Center Tool Co. 58
Okadee Company 59
OPW Corporation 151
Pacific Gear & Tool Works 31
Paris Distributor, Inc., Henry H. 60
Peerless Pump Division of Food Machinery & Chemical Corporation 95
Peerless Supply Co. Inc. 192
Penberthy Injector Co. 100
Petroleum Electric Power Assn. 148
Pierce Governor Co., Inc., The 125
Pipeline Anode Corp. 168
Pipe Line Service Corp. 166
Price Company, H. C. 129
Ramsey Company, Inc., Stan 172
Reed Roller Bit Company 66, 67
Refinery Supply Co., The 181
Regan Forge & Engineering Co. 175
Reliance Electric and Engineering Co. 38
Republic National Bank of Dallas 47
Republic Steel Corporation 51
Reynolds Metal Company 42
Rolo Manufacturing Co. 116
Ross-Martin Co. 192
Sawyer-Jensen-Ross Co. 173
Schlumberger Well Surveying Corp. 121
Schutt Corp. 192
Seismograph Service Corp. 179
Sivalls Tanks, Inc. 128
Smith Corporation, A. O. 116
Southern Mill & Mfg. Co. 9
Squier Co., John P. 184
Steel Forgings, Inc. 168
Taylor Forge & Pipe Works 156
Texas Company, The 26
Thomas Flexible Coupling Co. 114
Thornhill-Craver Co. Inside Back Cover
Tulsa Crating Co. 130
U. S. Gypsum Co. 55
United States Treasury Department 164
Universal Oil Products Co. 10, 11
Viking Pump Co. 116
Vogt Machine Co., Henry 23
Walworth Co. 5
Waukesha Sales & Service, Inc. 46
Web Wilson Oil Tools 175
Well Equipment Mfg. Corp. 63
Western Gear Works 31
Wickes Boiler Co., The 165
Wickwire Spencer Steel Division, Colorado Fuel and Iron Corp. 139
Williamson, Inc., T. D. 163
Wilson Manufacturing Co., Inc. 33
W-K-M Company 43
Young Radiator Company 49

LEGAL

Sealed bids for Oil and Gas Mining Leases on restricted Tribal and Allotted lands of the Fort Berthold Indian Reservation, North Dakota, will be received at the Office of the Superintendent of the said reservation, Elbowoods, North Dakota, until 11:00 A.M., Central Standard Time on July 27, 1953, and will be opened immediately thereafter in the presence of such bidders as may attend. This sale will be conducted under regulations as amended and promulgated by the Secretary of the Interior, 25 CFR 189 (Act of March 3, 1909, 35 Stat. 781, 783; 25 U.S.C. 396) governing the leasing of Allotted lands and 25 CFR 186 (Act of May 11, 1938, 52 Stat. 347; 25 U.S.C. 396 a-f) governing the leasing of Tribal land. All bids shall be enclosed in an envelope addressed to the Superintendent and plainly marked "Bid for Oil and Gas Mining Leases" to be opened at 11:00 A.M., July 27, 1953. The total acreage of which is 29,160.27 acres. All of this land is located in the county of Dunn, State of North Dakota. For additional information call or write the Superintendent of the Fort Berthold Agency, Elbowoods, North Dakota.

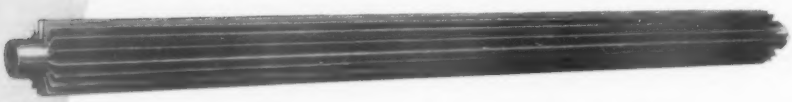
G-R.....

85 years of specialized experience in the design and construction of heat transfer apparatus . . . *the longest and most extensive experience* in this field



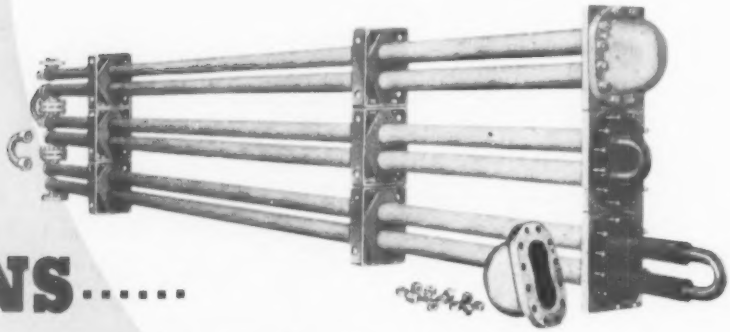
TWIN.....

a pipe within a pipe in a hair-pin design, and with closure consisting of only 3 parts . . . *the simplest heat exchanger* design on the market



G-FIN.....

the inner pipe surrounded by securely bonded longitudinal fins with 6 to 8 times more heat transfer surface than the same length of bare tubes . . . *the most effective design* for transfer of heat between fluids of unequal heat conductivity



SECTIONS.....

standard, interchangeable units that can be arranged in series or parallel, and increased or decreased in number, for any desired capacity and temperature range . . . *the widest adaptability* of any heat transfer apparatus for heating, cooling, condensing or heat exchanger services

THE GRISCOM-RUSSELL CO. · MASSILLON, OHIO

PIONEER IN HEAT TRANSFER APPARATUS

GR-330

Save the beans— throw away the holes

• Illustrated — Unibolt Flow Manifold for single wing tree, consisting of Unibolt Tee, Wing Valve, and Positive Choke Body.

LOW COST

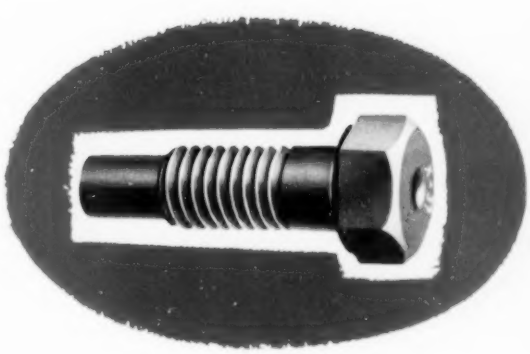
UNIBOLT

X-BEAN INSERTS
MAKE POSITIVE CHOKES AS GOOD AS NEW

You don't have to change beans. Change inserts. You accomplish the same results but for a fraction of the cost. Unibolt Master Beans, for Unibolt Choke Bodies and Unibolt Cage Nipples, are drilled to receive a small replaceable insert. So, when the insert wears out just replace it . . . save the bean.

These little inserts are available in **42 "X" sizes under 14/64ths.** That means that they are drilled in increments of 5% and 10% of well flow rather than in increments of 1/64th inch. Consequently, the flow of fluid or gas can be positively controlled with a degree of accuracy never before attained. If, for example, a well produces 10 bbls. through a 1/64-inch choke, to increase the choke to the next largest fractionally drilled size, 2/64-inch, would increase the production to approximately 40 bbls. On the other hand, a well that produces 10 bbls. through a size X-35 UNIBOLT X-Bean would produce only 10½ bbls. through the next largest size X-Bean, X-35.5; 11 bbls. through an X-36, and so on.

This accurate control of production is a safeguard against the harmful effect of periodically pulling a well too hard in order to make its allowable.



THORNHILL UNIBOLT CRAVER CO.

P. O. BOX 1184 HOUSTON, TEXAS

W7R – FIRST CHOICE FOR HARD ABRASIVE DRILLING

The popularity of Hughes "W7R" rock bits in hard abrasive areas is a matter of simple arithmetic. Their higher penetration rate and greater footage per bit mean more hole drilled faster *. . . and at a lower cost!*

That's why—in West Texas, the mountain states, and wherever hard abrasive formations are encountered, requiring maximum gage fortification—you find more Hughes "W7R" bits being used on more rigs than all other makes combined.

Experience gained in studying the performance of millions of bits in thousands of wells, over a period of more than 40 years, goes into every HUGHES bit.

HUGHES TRI-CONE® ROCK BITS